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UEE Electrotechnology Training Package

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UEE10120 Certificate I in ElectroComms Skills

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to perform work activities, including identifying and using a range of components, accessories, materials, tools, equipment, technologies, and customs for carrying out work in the electrotechnology – communications industry. Sectors in the industry are electronics; electrical; communications, including telecommunications voice, data, video and information technology; computer systems; instrumentation; lifts; refrigeration and air conditioning; and renewable/sustainable energy.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **180 weighting points** comprising:

120 core weighting points listed below; **plus**

60 general elective weighting points from the general elective units listed below.

Choose a total of 60 **weighting points** elective units from the list below, of which between 0 and 30 **weighting points** can be taken from Group A; and between 30 and 60 **weighting points** must be taken from Group B.

Up to 30 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
ICTICT203	Operate application software packages	20
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0009	Carry out routine work activities in an energy sector environment*	40
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEEEC0046	Operate and maintain amateur radio communication stations*	40

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Qualification Mapping Information

This qualification replaces and is equivalent to UEE10111 Certificate I in ElectroComms Skills

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE20120 Certificate II in Split Air Conditioning and Heat Pump Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to install, commission and decommission single head, split air conditioning and heat pumps systems to a prescribed routine where the maximum plant capacity for each system does not exceed 18 kilowatt (kW) refrigeration.

This includes wall hung, floor and ceiling suspended, cassette and ducted fan coil split systems and water heating heat pump systems. This qualification excludes competencies required for service, repair, maintenance, diagnostic/fault finding and electrical work or the safe and proper installation of commercial refrigeration, air conditioning and heat pump plant and equipment.

Relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The qualification meets only the training components for a national restricted heat pump, split system, installation and decommissioning Refrigerant Handling Licence, which is required to work on equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant, installing, commissioning or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **370 weighting points** comprising:

350 core weighting points listed below; **plus**

20 general elective weighting points from the general elective units listed below.

Up to 20 weighting points of the general elective units, may be selected, with appropriate

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contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed, weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0064	Recover, pressure test, evacuate, charge and leak test refrigerants - split systems*	60
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10

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HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE20111 Certificate II in Split Air-conditioning and Heat Pump Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE20520 Certificate II in Computer Assembly and Repair

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select components and assemble computer to customer specifications and carry out routine hardware repairs (generally by replacement) of known faulty components following prescribed routines.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

200 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 100 and 160 **weighting points** must be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECS0003	Assemble, set up and test computing devices*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
ICTTEN203	Install and configure a home or small office network	20
ICTTEN204	Install and configure a small to medium business network	20
ICTTEN205	Build and maintain a secure network	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20
UEECD0020	Fix and secure electrotechnology equipment*	20

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UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE20511 Certificate II in Computer Assembly and Repair

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE20720 Certificate II in Data and Voice Communications

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

An incorrect reference to the total general elective weighting point requirements from each group was fixed.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, assemble, set up and maintain simple equipment and systems to a prescribed routine Certification of telecommunication cabling in buildings and premises. It includes Australian Communications and media Authority (ACMA) requirements for Open Cabler registration.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **420 weighting points** comprising:

340 core weighting points listed below; **plus**

80 general elective weighting points from the general elective units listed below.

Choose a total of 80 **weighting points** elective units from the list below, of which between 0 and 40 **weighting points** can be taken from Group A; and between 40 and 80 **weighting points** must be taken from Group B; or all 80 **weighting points** must be taken from Group B.

Up to 4**0 weighting points of the general elective units Group A,** may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

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There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE20711 Certificate II in Data and Voice Communications

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE20920 Certificate II in Electronic Assembly

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select components, set up and operate component placement machines and carry out rework to a prescribed routine. It includes selecting components, assembling electronic sub-systems and carrying out reworks to a prescribed routine.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

220 core weighting points listed below; **plus**

140 general elective weighting points from the general elective units listed below.

Choose a total of 140 **weighting** points elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 80 and 140 weighting points must be taken from Group B; or all 140 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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		Weighting Points
Core units		
UEEAS0001	Assemble electronic components*	40
UEEAS0004	Select electronic components for assembly*	20
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20

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UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE20911 Certificate II in Electronic Assembly

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21020 Certificate II in Fire Alarms Servicing

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, assemble, set up and test base level fire protection systems in domestic and commercial premises.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **360 weighting points** comprising:

220 core weighting points listed below**; plus**

140 general elective weighting points from the general elective units listed below.

Choose a total of 140 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 80 and 140 **weighting points** must be taken from Group B; or all 140 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0041	Install fire detection and warning system apparatus*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20

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UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEEDV0003	Install and connect cabling for direct access to telecommunications service*	20
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21011 Certificate II in Fire Alarms Servicing

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21220 Certificate II in Antennae Equipment

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, assemble, connect and set up TV and radio reception antennae and multiple antenna outlets in buildings and premises.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **360 weighting points** comprising:

240 core weighting points listed below; **plus**

120 general elective weighting points from the general elective units listed below.

Choose a total of 120 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 60 and 120 **weighting points** must be taken from Group B; or all 120 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
RIIWHS202D	Enter and work in confined spaces	30
RIIWHS204D	Work safely at heights	20
RIIWHS205D	Control traffic with stop-slow bat	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20

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UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0062	Set up and test residential video/audio equipment*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21211 Certificate II in Antennae Equipment

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21420 Certificate II in Remote Area Power Supply Maintenance

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers the skills and knowledge required for routine maintenance of remote area power supplies (RAPS) consisting of battery banks, generator sets, photovoltaic (PV) arrays and wind generators.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

200 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 100 and 160 **weighting points** must be taken from Group B; or all elective units of 160 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points unless, directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERE0019	Maintain safety and tidiness of remote area power supply systems*	20
UEERE0023	Work safely with remote area power supply systems*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**

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UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERE0002	Assemble and connect remote area power supplies*	60
UEERE0006	Conduct periodic maintenance of remote area power supply battery banks*	40
UEERE0007	Conduct periodic maintenance of remote area power supply generator sets*	40
UEERE0008	Conduct periodic maintenance of remote area power supply photovoltaic arrays*	40
UEERE0009	Conduct periodic maintenance of remote area power supply wind generators*	40
UEERE0017	Maintain and repair facilities associated with remote area essential service operations*	120
UEERE0018	Maintain and repair remote area power generation facilities*	120
UEERE0020	Promote sustainable energy practices in the community	40
UEERE0021	Provide basic sustainable energy solutions for energy reduction in residential premises	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21411 Certificate II in Remote Area Power Supply Maintenance

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21620 Certificate II in Security Assembly and Set-up

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, assemble and set up wired and wireless base level security systems following prescribed routines.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

240 core weighting points listed below; **plus**

120 general elective weighting points from the general elective units listed below.

Choose a total of 120 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 60 and 120 **weighting points** must be taken from Group B; or all 120 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20
UEEAS0001	Assemble electronic components*	40
UEEAS0004	Select electronic components for assembly*	20
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40

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UEECD0043	Solve problems in direct current circuits*	80
UEEDV0003	Install and connect cabling for direct access to telecommunications service*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21611 Certificate II in Security Assembly and Set-up

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21720 Certificate II in Technical Support

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to collect/receive and store stock at worksites; set up and store equipment and tools; assist in installation, fault finding, and maintenance and repair activities.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

200 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 100 and 160 **weighting points** can be taken from Group B; or all 160 elective **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

Group B: General elective units		**Weighting Points**
UEECD0006	Apply technologies and concepts to energy sector work activities	40

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UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0009	Carry out routine work activities in an energy sector environment*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEERE0020	Promote sustainable energy practices in the community	40
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21711 Certificate II in Technical Support

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE21920 Certificate II in Electronics

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, assemble, set up and maintain electronic devices following prescribed routines.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **360 weighting points** comprising:

240 core weighting points listed below; **plus**

120 general elective weighting points from the general elective units listed below.

Choose a total of 120 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 60 and 120 **weighting points** must be taken from Group B; or all 120 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0016	Receive and store materials and equipment for electrotechnology work	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
ICTICT203	Operate application software packages	20
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40

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UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0023	Identify effects of energy on machinery and materials in an energy sector environment	120
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0039	Install and test microwave antennae and waveguides*	60

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UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0046	Operate and maintain amateur radio communication stations*	40
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE21911 Certificate II in Electronics

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE22020 Certificate II in Electrotechnology (Career Start)

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies for work entry program providing grounding in safety and basic skills and knowledge for work in any electrotechnology discipline.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **410 weighting points** comprising:

270 core weighting points listed below; **plus**

140 general elective weighting points from the general elective units listed below.

Choose a total of 140 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 80 and 140 **weighting points** must be taken from Group B; or all 140 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points unless directed from the Electrotechnology Industry Reference Committee (IRC)**.**

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
CPCCWHS1001	Prepare to work safely in the construction industry	10
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0009	Carry out routine work activities in an energy sector environment*	40
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0038	Provide solutions and report on routine electrotechnology problems	60
UEECD0046	Solve problems in single path circuits*	40
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment*	40
UEERE0021	Provide basic sustainable energy solutions for energy reduction in residential premises	40

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

Group B: General elective units		**Weighting Points**
ICTICT203	Operate application software packages	20
UEEAS0001	Assemble electronic components*	40
UEEAS0004	Select electronic components for assembly*	20
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0019	Fabricate, assemble and dismantle utilities industry	40

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	components*	
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0033	Produce products for carrying out energy sector work activities*	40
UEECD0034	Produce routine tools/devices for carrying out energy sector work activities*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE22011 Certificate II in Electrotechnology (Career Start).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE22120 Certificate II in Sustainable Energy (Career Start)

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies for work entry providing grounding in safety and basic skills and knowledge for work in any electrotechnology discipline.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **360 weighting points** comprising:

200 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 100 and 160 **weighting points** must be taken from Group B; or all electives units of 160 **weighting points** can be taken from Group B.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points unless, directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0043	Solve problems in direct current circuits*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERE0020	Promote sustainable energy practices in the community	40
UEERE0021	Provide basic sustainable energy solutions for energy reduction in residential premises	40

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECO0002	Maintain documentation	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20

Group B: Qualification elective units		**Weighting Points**
ICTICT203	Operate application software packages	20
UEEAS0001	Assemble electronic components*	40
UEEAS0004	Select electronic components for assembly*	20
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0009	Carry out routine work activities in an energy sector environment*	40
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40

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UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0033	Produce products for carrying out energy sector work activities*	40
UEECD0034	Produce routine tools/devices for carrying out energy sector work activities*	40
UEECD0038	Provide solutions and report on routine electrotechnology problems	60
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment*	40
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE22111 Certificate II in Sustainable Energy (Career Start)

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30120 Certificate III in Business Equipment

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to install, set up, test, fault find, repair and maintain photocopiers and fax machines.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

700 core weighting points listed below; **plus**

360 general elective weighting points from the general elective units listed below.

Choose a total of 360 **weighting points** elective units from the list below, of which between 0 and 160 **weighting points** can be taken from Group A; and between 200 and 360 **weighting points** must be taken from Group B; or all 360 **weighting points** can be taken from Group B.

Up to 160 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0005	Participate in business equipment work and competency development activities	60
UEEEC0032	Fault find and repair high-volume office equipment*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20

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UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40

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UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30111 Certificate III in Business Equipment

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30220 Certificate III in Computer Systems Equipment

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair and maintain computer equipment for data storage, personal computer and networks, measurement/analysis and control.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

560 core weighting points listed below; **plus**

500 general elective weighting points from the general elective units listed below.

Choose a total of 500 **weighting points** elective units from the list below, of which between 0 and 150 **weighting points** can be taken from Group A; and between 350 and 500 **weighting points** must be taken from Group B; or all 500 **weighting points** can be taken from Group B.

Up to 150 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0042	Solve problems in ELV single path circuits*	40
UEECO0006	Participate in computer equipment work and competency development activities	60
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0033	Use engineering applications software on personal computers	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0018	Develop web pages for engineering applications	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0030	Set up, configure and test biometric devices	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80

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UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

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Qualification Mapping Information

This qualification replaces and is equivalent to UEE30211 Certificate III in Computer Systems Equipment

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30320 Certificate III in Custom Electronics Installations

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up and test surround sound, home theatre and integration aspects for 'intelligent houses'. It covers the scope of Custom Electronic Design and Installation Association (CEDIA) Certification level 2.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

600 core weighting points listed below; **plus**

460 general elective weighting points from the general elective units listed below.

Choose a total of 500 **weighting points** elective units from the list below, of which between 0 and 150 **weighting points** can be taken from Group A; and between 310 and 460 **weighting points** must be taken from Group B; or all 500 **weighting points** can be taken from Group B.

Up to 150 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20

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UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0032	Support computer hardware and software for engineering applications	120
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0003	Assemble and set up basic security systems*	80

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UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50
UETTDRIS44	Perform HV field switching operation to a given schedule*	40

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UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30311 Certificate III in Custom Electronics Installations

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30420 Certificate III in Data and Voice Communications

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair and maintain telecommunications and high-performance data services in buildings and premises. It includes Australian Communications and Media Authority (ACMA) requirements for Open Cabler Registration.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

700 core weighting points listed below; **plus**

360 general elective weighting points from the general elective units listed below.

Choose a total of 360 **weighting points** elective units from the list below, of which between 0 and 100 **weighting points** can be taken from Group A; and between 260 and 360 **weighting points** must be taken from Group B; or all 360 **weighting points** can be taken from Group B.

Up to 100 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0012	Participate in voice and data communications work and competency development activities	60
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

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Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0028	Plan an integrated cabling installation system*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEDV0002	Install aerial telecommunication cables*	40
UEEDV0007	Install underground communication cables*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40

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UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30411 Certificate III in Data and Voice Communications

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30620 Certificate III in Electrical Machine Repair

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to overhaul and repair motor, transformer and control gear including rewinding.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

880 core weighting points listed below; **plus**

180 general elective weighting points from the general elective units listed below.

Choose a total of 180 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 120 and 180 **weighting points** can be taken from Group B (or all 180 elective **weighting points** can be taken from Group B).

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0022	Participate in electrical machine repair work and competency development activities	60
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0056	Place and connect electrical coils*	40

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UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0074	Wind electrical coils*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0066	Rewind LV direct current machines*	60

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UEEEL0067	Rewind single phase machines*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERA0091	Service small electrical appliances and power tools*	60
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30611 Certificate III in Electrical Machine Repair

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30720 Certificate III in Switchgear and Controlgear

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies for the construction, assembly and wiring of switchboards and control panels.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

900 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 100 and 160 **weighting points** can be taken from Group B (**or all 160 elective weighting points** can be taken from Group B).

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECO0024	Participate in switchgear and control gear work and competency development activities	60
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEL0003	Arrange circuits, control and protection for electrical installations*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0005	Develop and connect electrical control circuits*	80
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40

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UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
UEECO0015	Provide quotations for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40

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UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30711 Certificate III in Switchgear and Controlgear

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30820 Certificate III in Electrotechnology Electrician

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Three units added to General Electives.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides individuals with the skills and knowledge to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in buildings and premises. It includes Electrical Regulatory Authority Council (ERAC), or their successor's, Essential Performance Capabilities for an 'Unrestricted Electrician's license'.

The skills and knowledge described in this qualification require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this qualification are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training through an Australian Apprenticeship, may be required. To obtain an Unrestricted Electrician's Licence in most jurisdictions the qualification must be completed as an apprenticeship or Trades Recognition Australia (TRA) pathway. Where required for Licencing, the certification documentation issued must indicate if the qualification was completed as an apprenticeship or Trades Recognition Australia (TRA) pathway.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1,110 weighting points** comprising:

990 core weighting points listed below; **plus**

120 general elective weighting points.

General elective weighting points are to be selected from the Group A general elective units listed below, or **up to 40 general elective weighting points**, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion

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Volume Implementation Guide (CVIG), if not listed, weighting points will be 10 points.

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0044	Solve problems in multiple path circuits*	40
UEECD0046	Solve problems in single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0023	Participate in electrical work and competency development activities	60
UEEEL0003	Arrange circuits, control and protection for electrical installations*	40
UEEEL0005	Develop and connect electrical control circuits*	80
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	20
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	20
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	20

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UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*	40
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*	60
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	60
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*	40
UEEEL0047	Identify, shut down and restart systems with alternate supplies*	20
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UETTDRRF06	Perform rescue from a live LV panel*	20

Group A General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0050	Use and maintain the integrity of a portable gas detection	20

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	device*	
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0076	Inspect, test and maintain emergency lighting*	40
UEEEL0049	Install and maintain emergency safety systems*	60

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UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60

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UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0064	Recover, pressure test, evacuate, charge and leak test refrigerants - split systems*	60
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus	20

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	and systems*	
UEERE0049	Apply safe work practices in the rooftop solar industry	20
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UEERS0011	Install and maintain rail track circuit leads and bonds*	30
UEERS0017	Repair rail signalling power and control cables*	40
UEERS0019	Test copper rail signalling cables*	20
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50
UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB23	Install and maintain substation direct current systems*	30
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE30811 Certificate III in Electrotechnology Electrician.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE30920 Certificate III in Electronics and Communications

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair and maintain electronic equipment and devices at component/sub-assembly level with options in communications, audio, video and TV, personal computer and networks, security and custom installations.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

680 core weighting points listed below; **plus**

380 elective weighting points from the elective units listed below.

Up to 180 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units **Weighting Points**

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UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECO0007	Participate in electronics and communications work and competency development activities	60
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
ICTTEN312	Install telecommunications network equipment	40

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MSS402001	Apply competitive systems and practices	20
MSS402020	Apply quick changeover procedures	20
MSS402021	Apply Just in Time procedures	20
MSS402040	Apply 5S procedures	20
MSS402080	Undertake root cause analysis	20
MSS402081	Contribute to the application of a proactive maintenance strategy	20
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECD0040	Solve basic problems electronic and digital equipment	80

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	and circuits*	
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
UEEEC0046	Operate and maintain amateur radio communication stations*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured	40

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	communication copper cabling*	
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0008	Commission large fire protection systems*	40
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0032	Fault find and repair high-volume office equipment*	120
UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40

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UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0042	Install large security systems*	100
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0064	Solve oscillator problems*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40

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UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE30911 Certificate III in Electronics and Communications

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE31020 Certificate III in Fire Protection Control

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers the skills and knowledge required to select, install, set up, test, fault find, repair and maintain fire protection systems in multiple, commercial and industrial premises.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

650 core weighting points listed below; **plus**

410 general elective weighting points from the general elective units listed below.

Choose a total of 410 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; and between 260 and 410 **weighting points** must be taken from Group B; or all minimum 410 **weighting points** can be taken from Group B.

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0008	Participate in fire protection control work and competency development activities	60
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
CPPFES2043A	Prevent ozone depleting substance and synthetic greenhouse gas emissions	10

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Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0008	Commission large fire protection systems*	40
UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for	60

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	programmable controllers*	
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE31011 Certificate III in Fire Protection Control

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE31220 Certificate III in Instrumentation and Control

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair and maintain systems and devices for measurement and recording of physical/chemical phenomenon and related process control.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of 1060 weighting points comprising:

920 core weighting points listed below; **plus**

140 general elective weighting points from the general elective units listed below.

Choose a total of 140 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 80 and 140 **weighting points** must be taken from Group B; or all minimum 140 **weighting points** can be taken from Group B

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0009	Participate in instrumentation and control work and competency development activities	60
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40

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UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20

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UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0033	Set up gas analysis measuring and control instruments*	20
UEEIC0035	Set up scientific analysis measuring and control instruments*	20
UEEIC0036	Set up water analysis measuring and control instruments*	20
UEEIC0037	Set up weighting measuring and control instruments*	20
UEEIC0045	Troubleshoot medical equipment control systems*	120
UEEIC0046	Troubleshoot process control systems*	60
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE31211 Certificate III in Instrumentation and Control

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Links

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UEE31420 Certificate III in Security Equipment

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies in installation and pre-commissioning set-up of wired and wireless security systems in multiple, commercial industrial premises.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

640 core weighting points listed below; **plus**

420 general elective weighting points from the general elective units listed below.

Choose a total of 420 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; and between 250 and 420 **weighting points** must be taken from Group B; or all 420 **weighting points** can be taken from Group B.

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0011	Participate in security equipment work and competency development activities	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0042	Install large security systems*	100
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10

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ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0052	Program and test large security systems*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0065	Solve problems in basic electronic circuits*	100

Qualification Mapping Information

This qualification replaces and is equivalent to UEE31411 Certificate III in Security Equipment

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Links

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UEE32020 Certificate III in Renewable Energy - ELV

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair and maintain renewable energy (RE) equipment and systems.

It does not include electrical work covered by licensing requirements declared by the Electrical Regulators Advisory Council (ERAC) for an 'Electrician's licence'.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1060 weighting points** comprising:

700 core weighting points listed below; **plus**

360 general elective weighting points from the general elective units listed below.

Choose a total of 360 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; and between 190 and 360 **weighting points** can be taken from Group B; or all electives units of 360 **weighting points** can be taken from Group B.

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points unless, directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0007	Participate in electronics and communications work and competency development activities	60
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60
UEERE0046	Solve problems in stand-alone renewable energy (RE)	60

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	systems*	
UEERE0048	Verify compliance and functionality of an extra-low voltage renewable energy installation*	40

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
HLTAID003	Provide first aid	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEERE0006	Conduct periodic maintenance of remote area power supply battery banks*	40
UEERE0007	Conduct periodic maintenance of remote area power supply generator sets*	40
UEERE0008	Conduct periodic maintenance of remote area power supply photovoltaic arrays*	40
UEERE0009	Conduct periodic maintenance of remote area power supply wind generators*	40
UEERE0017	Maintain and repair facilities associated with remote area essential service operations*	120

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UEERE0018	Maintain and repair remote area power generation facilities*	120
UEERE0019	Maintain safety and tidiness of remote area power supply systems*	20
UEERE0023	Work safely with remote area power supply systems*	20
UEERE0024	Attend to breakdowns in remote area power supplies (RAPS)*	20
UEERE0026	Conduct checks in the demand side use of remote area power supplies (RAPS)*	40
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0041	Maintain operation of remote area power generation plant*	120
UEERE0043	Plan periodic maintenance schedules of remote area power supplies (RAPS)*	40
UEERE0045	Solve basic problems in micro-hydro systems*	20
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE32011 Certificate III in Renewable Energy - ELV

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Links

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UEE32120 Certificate III in Appliance Service

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

An incorrect reference to the Group A general elective weighting point requirements was fixed.

Imported units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to set up, service and repair electrical and refrigerated appliances with electives in gas appliances.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the national restricted domestic refrigeration and air conditioning appliance Refrigerant Handling Licence, which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to domestic refrigerating and air conditioning appliance work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Entry Requirements

There are no entry requirements for this qualification.

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Packaging Rules

A total of **1080 weighting points** comprising:

870 core weighting points listed below; **plus**

210 general elective weighting points from the general elective units listed below.

Choose a total of 210 **weighting points** elective units from the list below, of which between 0 and 100 **weighting points** can be taken from Group A; and between 110 and 210 **weighting points** must be taken from Group B; or all 210 elective unit **weighting points** can be taken from Group B.

Up to 100 **weighting points of the general elective units Group A**, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0004	Participate in appliance servicing work and competency development activities	60

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UEERA0037	Establish the basic operating conditions of vapour compression systems - appliances*	50
UEERA0043	Find and rectify faults in appliance control systems and devices*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0063	Recover, pressure test, evacuate, charge and leak test refrigerants - appliances*	50
UEERA0085	Service clothes washing machines and dryers*	40
UEERA0089	Service refrigeration appliances*	60
UEERA0091	Service small electrical appliances and power tools*	60
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERA0093	Verify functionality and compliance of appliances*	20
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20

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CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
HLTAID011	Provide First Aid	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0083	Service and repair microwave ovens*	40
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0086	Service dishwasher machines*	40

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UEERA0087	Service electrical heating appliances*	60
UEERA0088	Service gas heating appliances*	40
UEERA0090	Service room air conditioners*	30

Qualification Mapping Information

This qualification replaces and is equivalent to UEE32111 Certificate III in Appliance Service

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE32220 Certificate III in Air Conditioning and Refrigeration

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select components, install, set up, test, fault find, repair and maintain refrigeration systems and equipment that apply to food storage and preservation, and air conditioning and air distribution equipment in buildings and premises. It includes regulatory requirements for purchasing and handling refrigerants.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Entry Requirements

There are no entry requirements for this qualification.

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Packaging Rules

A total of **1210 weighting points** comprising:

1070 core weighting points listed below; **plus**

140 general elective weighting points from the general elective units listed below.

Choose a total of 140 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 80 and 140 **weighting points** must be taken from Group B; or all electives units of 140 **weighting points** can be taken from Group B.

Up to 30 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0010	Participate in refrigeration and air conditioning work and competency development activities	60

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UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20

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UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
HLTAID011	Provide First Aid	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20
UETTDRRF06	Perform rescue from a live LV panel*	20

Group B: Qualification elective units.		**Weighting Points**
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10
UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10

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UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment*	20
UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment*	20
UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems*	20
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0057	Operate ammonia refrigeration plant*	40
UEERA0065	Repair and service ammonia refrigeration systems*	20
UEERA0066	Repair and service carbon dioxide refrigeration systems*	20
UEERA0067	Repair and service secondary refrigeration systems*	20
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0069	Resolve problems in beverage dispensers*	40
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0071	Resolve problems in dairy refrigeration systems*	20
UEERA0072	Resolve problems in hydronic systems*	40
UEERA0073	Resolve problems in ice making systems*	20
UEERA0074	Resolve problems in industrial refrigeration systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0077	Resolve problems in transport refrigeration systems*	20

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UEERA0078	Resolve problems in ultra-low temperature refrigeration systems*	20
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE32211 Certificate III in Air-conditioning and Refrigeration

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE33020 Certificate III in Electrical Fitting

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

One elective unit that was in core removed from electives - was duplicate error.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to manufacture, fit, assemble, erect, operate, test, fault find, alter and repair electrical equipment and includes electrical wiring work only if that work is associated with assembling, maintaining, terminating or altering the wiring between electrical components within a plant or machinery. An electrical fitter is not authorised to install any electrical wiring systems within an electrical installation as prescribed by definitions contained in AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)..

Electrical equipment means any appliance, article, accessory, wire, fitting, cable, conduit or apparatus that generates, uses, conveys or controls (or that is intended to generate, use, convey or control) electricity above extra-low voltage (ELV).

The skills and knowledge described in this qualification may require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this qualification may be subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training through an Australian Apprenticeship, may be required.

Licensing, legislative and regulatory requirements that apply to this qualification can vary between states and territories. Some jurisdictions require that the qualification is completed as an apprenticeship to obtain an Electrical Occupational License. Relevant information must be sourced prior to commencing the qualification. Where required for Licencing, the certification documentation issued must indicate if the qualification was completed as an apprenticeship or Trades Recognition Australia (TRA) pathway.

Entry Requirements

There are no entry requirements for this qualification.

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Packaging Rules

A total of **1060 weighting points** comprising:

810 core weighting points listed below; **plus**

250 general elective weighting points.

General elective weighting points are to be selected from the Group A general elective units listed below, or **up to 60 weighting points of the general elective units** may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
HLTAID001	Provide cardiopulmonary resuscitation	10
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0044	Solve problems in multiple path circuits*	40
UEECD0046	Solve problems in single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0023	Participate in electrical work and competency development activities	60

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UEEEL0003	Arrange circuits, control and protection for electrical installations*	40
UEEEL0005	Develop and connect electrical control circuits*	80
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*	60
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEEEL0028	Conduct compliance and functional verification of electrical apparatus and existing circuits*	40
UEEEL0047	Identify, shut down and restart systems with alternate supplies*	20
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20

Group A: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40

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UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	20
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	20
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40

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UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0074	Wind electrical coils*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III (‘t’)*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60
UEEHA0012	Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)*	60
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60

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UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0043	Find and rectify faults in appliance control systems and devices*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70

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UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0085	Service clothes washing machines and dryers*	40
UEERA0087	Service electrical heating appliances*	60
UEERA0089	Service refrigeration appliances*	60
UEERA0091	Service small electrical appliances and power tools*	60
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20
UEERL0006	Attach HV flexible cables and plugs*	40
UEERL0007	Disconnect-reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles*	60
UEERL0008	Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation*	60
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UEERS0017	Repair rail signalling power and control cables*	40
UEERS0019	Test copper rail signalling cables*	20
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50
UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40

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UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRRF06	Perform rescue from a live LV panel*	20
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE33011 Certificate III in Electrical Fitting

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40120 Certificate IV in Computer Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain data processing, communications and control aspects of systems used for monitoring and control of systems for access, surveillance, safety and effective operation of manufacturing, buildings, structures, premises and precincts.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

600 core weighting points listed below; **plus**

680 general elective weighting points from the general elective units listed below.

Choose a total of 680 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; and between 0 and 500 **weighting points** must be taken from Group B; and between 180 and 680 **weighting points** must be taken from Group C; or all 680 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
ICTICT203	Operate application software packages	20
ICTTEN419	Implement and troubleshoot enterprise routers and	100

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	switches	
ICTTEN420	Design, install and configure an internetwork	100
ICTTEN421	Apply advanced routing protocols to network design	80
ICTTEN422	Configure and troubleshoot advanced network switching	80
ICTTEN423	Install and maintain a wide area network	80
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80

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UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0018	Develop web pages for engineering applications	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0030	Set up, configure and test biometric devices	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0059	Repair routine business equipment faults*	120

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UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40

Group C: Qualification elective units.		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0014	Develop computer network services*	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0021	Install and administer UNIX/LINUX-based networked computers	80

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UEECS0023	Install and configure network systems for internetworking*	120
UEECS0024	Integrate multiple computer operating systems on a client server local area network	80
UEEIC0012	Develop structured programs to control external devices*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE40111 Certificate IV in Computer Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40220 Certificate IV in Electrical - Data and Voice Communications

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain electrical and communications systems and equipment in building and premises. It includes Australian Communications Media Authority (ACMA) requirements for Open Cabler registration.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician.

or

- A current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **420 weighting points** comprising:

260 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 80 **weighting points** can be taken from Group A; between 0 and 80 **weighting points** can be taken from Group B; and between 80 and 160 **weighting points** can be taken from Group C; or all minimum 160 **weighting points** can be taken from Group C.

Up to 80 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20

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UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECD0028	Plan an integrated cabling installation system*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEDV0002	Install aerial telecommunication cables*	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0007	Install underground communication cables*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice	40

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	installations*	
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20

Group C: Qualification elective units		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECO0025	Provide quotations for inspection and compliance audit services	20
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE40211 Certificate IV in Electrical - Data and Voice Communications

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40320 Certificate IV in Installation Inspection and Audits

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies in mandatory and contractual inspections of electrical systems and auditing of entities for compliance with electrical safety requirements.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

220 core weighting points listed below; **plus**

220 general elective weighting points from the general elective units listed below.

Choose a total of 220 **weighting points** elective units from the list below, of which between 0 and 80 **weighting points** can be taken from Group A; between 0 and 110 **weighting points** can be taken from Group B; and between 110 and 220 **weighting points** must be taken from Group C (or all elective **weighting points** can be taken from Group C).

Up to 80 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly

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to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECO0002	Maintain documentation	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60

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UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20

Group C: General elective units		**Weighting Points**
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand	40

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	up to 400 A per phase*	
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE40311 Certificate IV in Installation Inspection and Audits

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40420 Certificate IV in Electrical - Instrumentation

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

An incorrect reference to the Group C general elective requirements was fixed.

Imported unit codes updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain equipment and systems for the control of plant, machines and processes.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

320 core weighting points listed below; **plus**

120 general elective weighting points from the general elective units listed below.

Choose a total of 120 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 0 and 60 **weighting points** can be taken from Group B; and between 60 and 120 **weighting points** must be taken from Group C (or all 120 elective **weighting points** can be taken from Group C).

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology

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Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20

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UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

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UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60

Group C: General elective units		**Weighting Points**
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60

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UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE40411 Certificate IV in Electrical - Instrumentation

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40520 Certificate IV in Electrical - Air Conditioning Split Systems

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

An incorrect reference to the Refrigeration handling licence entry requirement was fixed.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain electrical systems and equipment in buildings and premises and split air conditioning systems to a prescribed routine where the maximum plant capacity for each system does not exceed 18 kilowatt (kW). It includes regulatory requirements for purchasing and handling refrigerants for split systems.

Split systems include wall hung, floor and ceiling suspended, cassette and ducted fan coil split systems. This qualification excludes competencies required for service, repair, maintenance or the safe and proper installation of commercial refrigeration and air conditioning plant and equipment

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory

and

- a Trainee Refrigerant Handling Licence.

Packaging Rules

A total of **450 weighting points** comprising:

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290 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 80 **weighting points** can be taken from Group A; and between 0 and 80 **weighting points** can be taken from Group B; and between 80 and 160 **weighting points** can be taken from Group C (or all electives units of 160 **weighting points** can be taken from Group C).

Up to 80 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0064	Recover, pressure test, evacuate, charge and leak test refrigerants - split systems*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20

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CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10

Group C: Qualification elective units		**Weighting Points**
UEECD0047	Supervise and coordinate energy sector work activities	40
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV	60

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	electrical installations*	
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0003	Analyse the thermodynamic performance of HVAC/R systems	50

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE40511 Certificate IV in Electrical - Air-conditioning Split Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40620 Certificate IV in Electrotechnology - Systems Electrician

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Three units added to Group B General Electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain electrical systems and equipment with options, typically in explosion protection; electrical machines; electrical inspection; safety auditing; contracting; lifts and energy supply/distribution.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

120 core weighting points listed below; **plus**

320 general elective weighting points from the general elective units listed below.

Choose a total of 320 **weighting points** elective units from the list below, of which between 0 and 100 **weighting points** can be taken from Group A; between 0 and 100 **weighting points** can be taken from Group B; and between 220 and 320 **weighting points** can be taken from Group C (**or all 320 elective weighting points** can be taken from Group C).

Up to 100 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or

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accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or	20

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service jobs

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20

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UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40

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UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERE0016	Install, configure and commission LV grid-connected	40

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	photovoltaic power systems*	
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0050	Identify and isolate multiple supply systems*	20
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UEERS0011	Install and maintain rail track circuit leads and bonds*	30
UEERS0017	Repair rail signalling power and control cables*	40
UEERS0019	Test copper rail signalling cables*	20
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50
UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB23	Install and maintain substation direct current systems*	30
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Group C: General elective units		**Weighting Points**
UEECD0063	Write work activity reports	20
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report	60

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	findings*	
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40

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UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40

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UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE40611 Certificate IV in Electrotechnology - Systems Electrician

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40720 Certificate IV in Electronics and Communications

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies in audio/video, data systems and computer/network hardware, medical applications and communication aspects of electronic i.e. transmitters, communications medium/channel, receivers, attenuation and noise reduction. It includes detection/surveillance.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

720 core weighting points listed below; **plus**

560 general elective weighting points from the general elective units listed below.

Choose a total of 560 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; and between 0 and 360 **weighting points** must be taken from Group B; and between 200 and 560 **weighting points** must be taken from Group C; or all 560 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.	**Weighting Points**

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BSBCUS201	Deliver a service to customers	20
ICTICT203	Operate application software packages	20
ICTTEN312	Install telecommunications network equipment	40
MSS402001	Apply competitive systems and practices	20
MSS402020	Apply quick changeover procedures	20
MSS402021	Apply Just in Time procedures	20
MSS402040	Apply 5S procedures	20
MSS402080	Undertake root cause analysis	20
MSS402081	Contribute to the application of a proactive maintenance strategy	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40

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UEEAS0006	Use lead-free soldering techniques*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data	40

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	communication cabling*	
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0008	Commission large fire protection systems*	40
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0032	Fault find and repair high-volume office equipment*	120

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UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40
UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0042	Install large security systems*	100
UEEEC0046	Operate and maintain amateur radio communication stations*	40
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0064	Solve oscillator problems*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120

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UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEEEC0009	Commission satellite and microwave communication systems*	40
UEEEC0012	Design custom electronic equipment installations*	120

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UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0023	Diagnose and rectify faults in digital transmission circuits and systems*	80
UEEEC0024	Diagnose and rectify faults in electronic display circuits*	60
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0030	Fault find and repair electronic medical equipment*	120
UEEEC0031	Fault find and repair global positioning systems*	60
UEEEC0033	Fault find and repair navigation systems*	60
UEEEC0034	Fault find and repair radar apparatus and systems*	120
UEEEC0035	Fault find and repair satellite-based surveillance and observation systems*	60
UEEEC0036	Fault find and repair sonar apparatus and systems*	120
UEEEC0037	Fault find and repair telecommunication apparatus and systems*	60
UEEEC0051	Program and commission commercial video/audio systems*	40
UEEEC0052	Program and test large security systems*	120
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0028	Provide solutions to problems in industrial control systems*	60

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Qualification Mapping Information

This qualification replaces and is equivalent to UEE40711 Certificate IV in Electronics and Communications

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40820 Certificate IV in Electrical - Fire Protection Control Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain fire protection control systems in buildings.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician.

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

340 core weighting points listed below; **plus**

100 general elective weighting points from the general elective units listed below.

Choose a total of 100 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; and between 40 and 100 **weighting points** can be taken from Group C; or all minimum 100 **weighting points** can be taken from Group C.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of

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competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEC0008	Commission large fire protection systems*	40
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
CPPFES2043A	Prevent ozone depleting substance and synthetic greenhouse gas emissions	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20

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UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0049	Install and maintain emergency safety systems*	60
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

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UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60

Group C: Qualification elective units		**Weighting Points**
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE40811 Certificate IV in Electrical - Fire Protection Control Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE40920 Certificate IV in Industrial Electronics and Control

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

One unit added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain equipment and systems for the control of plant, machines and processes.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

240 core weighting points listed below; **plus**

200 general elective weighting points from the general elective units listed below.

Choose a total of 200 **weighting points** elective units from the list below, of which between 0 and 100 **weighting points** can be taken from Group A; and between 0 and 100 **weighting points** can be taken from Group B; and between 100 and 200 **weighting points** can be taken from Group C (or all minimum 200 **weighting points** can be taken from Group C).

Up to 100 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology

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Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work	40

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	related to electrical equipment	
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERE0050	Identify and isolate multiple supply systems*	20

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

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UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE40911 Certificate IV in Industrial Electronics and Control

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41020 Certificate IV in Energy Management and Control

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to Group B General Electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop strategies for the reduction of energy in buildings and to recommend changes in the way in which energy is controlled in the building, either by the installation of new control equipment or by the modification or re-programming of existing control equipment.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘ Unrestricted Electricians Licence’ ‘ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

140 core weighting points listed below; plus

300 general elective weighting points from the general elective units listed below.

Choose a total of 300 **weighting points** elective units from the list below, of which between 0 and 100 **weighting points** can be taken from Group A; between 0 and 100 **weighting points** can be taken from Group B; and between 200 and 300 **weighting points** can be taken from Group C (or all electives units of 300 **weighting points** can be taken from Group C).

Up to 100 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or

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accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECD0028	Plan an integrated cabling installation system*	40
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40

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UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20

Group C: Qualification elective units		**Weighting Points**
UEECD0061	Write specifications for refrigeration and air conditioning engineering projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40

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UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE41011 Certificate IV in Energy Management and Control

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41120 Certificate IV in Electrical - Lift Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain lifts, escalators and associated equipment.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

360 core weighting points listed below; **plus**

80 general elective weighting points from the general elective units listed below.

Choose a total of 80 **weighting points** elective units from the list below, between 0 and 20 **weighting points** can be taken from Group A; between 0 and 20 **weighting points** can be taken from Group B; and between 40 and 80 **weighting points** can be taken from Group C (or all elective 80 **weighting points** can be taken from Group C).

Up to 20 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of

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competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60

Group C: General elective units		**Weighting Points**
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE41111 Certificate IV in Electrical - Lift Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41220 Certificate IV in Electrical - Rail Signalling

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to install, certify, fault find and maintain rail signalling equipment and systems.

This includes requirements for performing like-for-like replacement, performing authorised installations and alterations, and applying emergency operational restriction. It excludes changing circuit principles, changing the design function and commissioning.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **510 weighting points** comprising:

440 core weighting points listed below; **plus**

70 general elective weighting points from the general elective units listed below.

Choose a total of 70 **weighting points** elective units from the list below, of which between 0 and 30 **weighting points** can be taken from Group A; of which between 0 and 40 **weighting points** can be taken from Group B; and between 30 and 70 **weighting points** can be taken from Group C (or all 70 elective **weighting points** can be taken from Group C).

Up to 30 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UEERS0004	Find and repair rail signalling system faults*	20
UEERS0005	Install and maintain active level crossing equipment*	40
UEERS0009	Install and maintain power-operated point actuating devices*	40
UEERS0010	Install and maintain rail signalling power supplies*	40
UEERS0011	Install and maintain rail track circuit leads and bonds*	30
UEERS0012	Install and maintain trackside signal and train protection equipment*	40
UEERS0013	Install and maintain train detection equipment*	40
UEERS0014	Install and maintain vital relay interlocking systems*	40
UEERS0017	Repair rail signalling power and control cables*	40
UEERS0019	Test copper rail signalling cables*	20

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Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
TLIS2004	Install and maintain rail bonding systems	40
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0033	Use engineering applications software on personal computers	40

Group C: General elective units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0058	Observe safety practices are followed in the vicinity of isolated electrical cables*	20
UEERS0002	Decommission electrical and electromechanical rail signalling from service*	20
UEERS0003	Develop rail signalling system maintenance programs*	20
UEERS0006	Install and maintain computer-based interlocking rail systems*	30

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UEERS0007	Install and maintain non-vital screen-based control systems*	20
UEERS0008	Install and maintain non-vital telemetry systems*	40
UEERS0015	Maintain electronic and microprocessor-based remote control systems*	20
UEERS0016	Maintain mechanical rail signalling equipment and infrastructure*	20
UEERS0018	Test and commission rail power equipment*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE41211 Certificate IV in Electrical – Rail Signalling

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41520 Certificate IV in Video and Audio Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to service high-end audio, video, display systems and high-definition television (HDTV).

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

840 core weighting points listed below; plus

440 general elective weighting points from the general elective units listed below.

Choose a total of 440 **weighting points** elective units from the list below, of which between 0 and 140 **weighting points** can be taken from Group A; and between 0 and 220 **weighting points** must be taken from Group B; and between 220 and 440 **weighting points** must be taken from Group C; or all 440 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

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Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system	40

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	and software	
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60

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UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0032	Fault find and repair high-volume office equipment*	120
UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40
UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0042	Install large security systems*	100
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60

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UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0064	Solve oscillator problems*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEEEC0012	Design custom electronic equipment installations*	120
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0023	Diagnose and rectify faults in digital transmission circuits and systems*	80
UEEEC0024	Diagnose and rectify faults in electronic display	60

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	circuits*	
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0030	Fault find and repair electronic medical equipment*	120
UEEEC0037	Fault find and repair telecommunication apparatus and systems*	60
UEEEC0051	Program and commission commercial video/audio systems*	40
UEEEC0052	Program and test large security systems*	120
UEEIC0012	Develop structured programs to control external devices*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE41511 Certificate IV in Video and Audio Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41620 Certificate IV in Renewable Energy

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to select, install, commission, fault find and maintain multiple renewable energy (RE) sources and equipment for control of energy use.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1280 weighting points** comprising:

740 core weighting points listed below; **plus**

540 general elective weighting points from the general elective units listed below.

Choose a total of 540 **weighting points** elective units from the list below, of which between 0 and 160 **weighting points** can be taken from Group A; between 0 and 320 **weighting points** can be taken from Group B; and between 220 and 380 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60

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UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60
UEERE0048	Verify compliance and functionality of an extra-low voltage renewable energy installation*	40

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0017	Maintain and repair facilities associated with remote area essential service operations*	120
UEERE0024	Attend to breakdowns in remote area power supplies (RAPS)*	20
UEERE0026	Conduct checks in the demand side use of remote area	40

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	power supplies (RAPS)*	
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0041	Maintain operation of remote area power generation plant*	120
UEERE0043	Plan periodic maintenance schedules of remote area power supplies (RAPS)*	40
UEERE0045	Solve basic problems in micro-hydro systems*	20
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

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UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0027	Coordinate maintenance of renewable energy (RE) apparatus and systems*	20

Qualification Mapping Information

This qualification replaces and is equivalent to UEE41611 Certificate IV in Renewable Energy

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41720 Certificate IV in Rail - Communications and Network Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, commission, fault find and maintain radio and dedicated telecommunications networks in rail systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

720 core weighting points listed below; **plus**

560 general elective weighting points from the general elective units listed below.

Choose a total of 560 **weighting points** elective units from the list below, of which between 0 and 160 **weighting points** can be taken from Group A; and between 0 and 340 **weighting points** must be taken from Group B; and between 220 and 560 **weighting points** must be taken from Group C; or all 560 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.	**Weighting Points**

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BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40

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UEEEC0019	Develop software solutions for microcontroller-based systems*	60

Group C: Qualification elective units.		**Weighting Points**
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0023	Diagnose and rectify faults in digital transmission circuits and systems*	80
UEEEC0024	Diagnose and rectify faults in electronic display circuits*	60
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0033	Fault find and repair navigation systems*	60
UEEEC0051	Program and commission commercial video/audio systems*	40
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE41711 Certificate IV in Rail - Communications and Network Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE41920 Certificate IV in Electrical - Renewable Energy

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in buildings and premises.

It includes requirements and competencies to select, install, set up, test, fault find, repair and maintain stand-alone renewable energy (RE) equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

280 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 50 **weighting points** can be taken from Group A; between 0 and 120 **weighting points** can be taken from Group B; and between 40 and 160 **weighting points** can be taken from Group C (or all 160 elective **weighting points** can be taken from Group C).

Up to 50 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or

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accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20

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UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0019	Maintain safety and tidiness of remote area power supply systems*	20
UEERE0023	Work safely with remote area power supply systems*	20
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0037	Install, configure and commission LV micro-hydro systems rated up to 6.4 kW*	20
UEERE0038	Install, configure and commission LV wind energy conversion systems rated up to 10 kW*	40
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0045	Solve basic problems in micro-hydro systems*	20

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UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERE0049	Apply safe work practices in the rooftop solar industry	20
UEERE0050	Identify and isolate multiple supply systems*	20
UEERE4001	Install, maintain and fault find battery storage systems for grid-connected photovoltaic systems*	60
UEERE5001	Design battery storage systems for grid-connected photovoltaic systems*	80

Group C: Qualification elective units		**Weighting Points**
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0027	Coordinate maintenance of renewable energy (RE) apparatus and systems*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE41911 Certificate IV in Electrical - Renewable Energy

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42020 Certificate IV in Electrical - Photovoltaic systems

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in buildings and premises.

It includes requirements and competencies to select, install, set up, test, fault find, repair and maintain photovoltaic (PV) systems and associated equipment.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

260 core weighting points listed below; **plus**

180 general elective weighting points from the general elective units listed below.

Choose a total of 180 **weighting points** elective units from the list below, of which between 0 and 90 **weighting points** can be taken from Group A; between 0 and 90 **weighting points** can be taken from Group B; and between 90 and 180 **weighting points** can be taken from Group C (or all electives units of 180 **weighting points** can be taken from Group C).

Up to 90 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or

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accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEL0013	Install, set up and commission interval metering*	20
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20

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UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0037	Install, configure and commission LV micro-hydro systems rated up to 6.4 kW*	20
UEERE0038	Install, configure and commission LV wind energy	40

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	conversion systems rated up to 10 kW*	
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0045	Solve basic problems in micro-hydro systems*	20
UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERE0049	Apply safe work practices in the rooftop solar industry	20
UEERE0050	Identify and isolate multiple supply systems*	20
UEERE4001	Install, maintain and fault find battery storage systems for grid-connected photovoltaic systems*	60

Group C: Qualification elective units		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0050	Install and replace low voltage current transformer metering*	20

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UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE42011 Certificate IV in Electrical - Photovoltaic systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42120 Certificate IV in Electrotechnology - Electrical Contracting

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to Group B General Electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to set up and manage an electrical contracting business.

It includes competencies required by regulations for an electrical contracting licence; and requirements and competencies to select, install, set up, test, fault find, repair and maintain photovoltaic systems and associated equipment.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **360 weighting points** comprising:

120 core weighting points listed below; **plus**

240 general elective weighting points from the general elective units listed below.

Choose a total of 240 **weighting points** elective units from the list below, of which between 0 and 120 **weighting points** can be taken from Group A; between 0 and 120 **weighting points** can be taken from Group B; and between 120 and 240 can be taken from Group C (or all 240 elective **weighting points** can be taken from Group C).

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Up to 120 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20

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UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20

Group C: General elective units		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECO0025	Provide quotations for inspection and compliance audit services	20

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UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40

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Qualification Mapping Information

This qualification replaces and is not equivalent to UEE42111 Certificate IV in Electrotechnology – Electrical Contracting

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42220 Certificate IV in Instrumentation and Control

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair, maintain and commission systems and devices for measurement and recording of physical/chemical phenomenon and related process control systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

1080 core weighting points listed below; **plus**

200 general elective weighting points from the general elective units listed below.

Choose a total of 200 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 0 and 100 **weighting points** must be taken from Group B; and between 100 and 200 **weighting points** must be taken from Group C or all minimum 200 **weighting points** can be taken from Group C.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40

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UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0037	Set up weighting measuring and control instruments*	20
UEEIC0046	Troubleshoot process control systems*	60
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40

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UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0003	Assist in commissioning process and instrumentation control systems*	40
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEEIC0044	Troubleshoot measuring and analysis systems*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE42211 Certificate IV in Instrumentation and Control

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42620 Certificate IV in Hazardous areas - Electrical

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Qualification description updated.

Imported units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to supervise selection, installation, commissioning maintenance and testing of explosion-protected equipment and systems for control and monitoring of plant and processes.

The qualification provides competencies in working with explosion-protection techniques.

Site-specific work permits maybe required to work in a hazardous environment. Licensing, legislative or certification requirements, and additional/other conditions may apply in some jurisdictions subject to regulations related to electrical work and work health and safety (WHS)/occupational health and safety (OHS).

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of 440 weighting points comprising:

200 core weighting points listed below; **plus**

240 general elective weighting points from the general elective units listed below.

Choose a total of 240 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; between 0 and 80 **weighting points** can be taken from Group B; and between 140 and 240 can be taken from Group C (or all 240 elective **weighting points** can be taken from Group C).

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Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20

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UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III (‘t’)*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60
UEEHA0012	Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)*	60
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60
UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60

Group C: General elective units		**Weighting Points**
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60

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UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE42611 Certificate IV in Hazardous areas - Electrical

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42720 Certificate IV in Air Conditioning and Refrigeration Servicing

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies in high-level fault diagnosis and rectification, commissioning and maintenance of refrigeration systems and equipment that apply to commercial food storage and preservation, air conditioning, air distribution equipment and/or special applications. It includes regulatory requirements for purchasing and handling refrigerants.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

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Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1350 weighting points** comprising:

1170 core weighting points listed below; **plus**

180 general elective weighting points from the general elective units listed below.

Choose a total of 180 **weighting points** elective units from the list below, of which between 0 and 90 **weighting points** can be taken from Group A; and between 0 and 90 **weighting points** must be taken from Group B; and between 90 and 180 **weighting points** must be taken from Group C; or all electives units of 180 **weighting points** can be taken from Group C.

Up to 90 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20

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UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0032	Diagnose and rectify faults in complex air conditioning/refrigeration systems*	100
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0094	Verify functionality and compliance of refrigeration and	40

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	air conditioning installations*	
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60

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UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10
UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment*	20
UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment*	20
UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems*	20
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0065	Repair and service ammonia refrigeration systems*	20
UEERA0066	Repair and service carbon dioxide refrigeration systems*	20
UEERA0067	Repair and service secondary refrigeration systems*	20
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0069	Resolve problems in beverage dispensers*	40
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0072	Resolve problems in hydronic systems*	40
UEERA0073	Resolve problems in ice making systems*	20
UEERA0074	Resolve problems in industrial refrigeration systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0077	Resolve problems in transport refrigeration systems*	20

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UEERA0078	Resolve problems in ultra-low temperature refrigeration systems*	20
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERA0010	Commission complex heating, ventilation and air conditioning (HVAC) systems*	80
UEERA0011	Commission complex refrigeration systems and equipment*	80
UEERA0012	Commission complex refrigeration/air conditioning control systems*	40
UEERA0013	Commission refrigeration/air conditioning hydronic systems*	80
UEERA0033	Diagnose faults in complex HVAC/refrigeration control systems*	80
UEERA0056	Monitor and adjust refrigeration energy management systems*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE42711 Certificate IV in Air-conditioning and Refrigeration Servicing

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42820 Certificate IV in Air-conditioning Systems Energy Management and Control

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop strategies for the reduction of energy in buildings and to recommend changes in the way in which energy is controlled in the building, either by the installation of new control equipment or by the modification or re-programming of existing equipment. It includes regulatory requirements for purchasing and handling refrigerants.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

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Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1350 weighting points** comprising:

1190 core weighting points listed below; **plus**

160 general elective weighting points from the general elective units listed below.

Choose a total of 160 **weighting points** elective units from the list below, of which between 0 and 80 **weighting points** can be taken from Group A; and between 0 and 80 **weighting points** must be taken from Group B; and between 80 and 160 **weighting points** must be taken from Group C; or all electives units of 160 **weighting points** can be taken from Group C.

Up to 80 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20

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UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0039	Evaluate and report on building services energy management systems*	80
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0092	Solve problems in low voltage refrigeration and air	40

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	conditioning circuits*	
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

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UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERA0010	Commission complex heating, ventilation and air conditioning (HVAC) systems*	80
UEERA0011	Commission complex refrigeration systems and equipment*	80
UEERA0012	Commission complex refrigeration/air conditioning control systems*	40
UEERA0013	Commission refrigeration/air conditioning hydronic systems*	80
UEERA0056	Monitor and adjust refrigeration energy management systems*	40
UEERA0033	Diagnose faults in complex HVAC/refrigeration control systems*	80

Qualification Mapping Information

This qualification replaces and is equivalent to UEE42811 Certificate IV in Air-conditioning Systems Energy Management and Control

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE42920 Certificate IV in Refrigeration and Air Conditioning Systems

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to determine heat loads and select equipment for basic commercial refrigeration or residential air conditioning applications. It includes regulatory requirements for purchasing and handling refrigerants.

Basic commercial refrigeration includes commercial cold rooms, freezer rooms and cabinets with a single compressor or condensing unit. This does not include large, complex commercial applications or industrial applications.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

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Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1360 weighting points** comprising:

1300 core weighting points listed below; **plus**

60 general elective weighting points from the general elective units listed below.

Choose a total of 60 **weighting points** elective units from the list below, of which between 0 and 20 **weighting points** can be taken from Group A; and between 0 and 20 **weighting points** can be taken from Group B; and 40 **weighting points** must be taken from Group C.

Up to 20 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0027	Participate in development and follow a personal competency development plan	20

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UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0034	Establish heat loads for commercial refrigeration and/or air conditioning applications*	80
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0038	Establish the thermodynamic parameters of refrigeration and air conditioning systems*	80
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated	40

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	controls*	
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
ICTICT214	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		Weighting Points
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10

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UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment*	20
UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment*	20
UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems*	20
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0065	Repair and service ammonia refrigeration systems*	20
UEERA0066	Repair and service carbon dioxide refrigeration systems*	20
UEERA0067	Repair and service secondary refrigeration systems*	20
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0069	Resolve problems in beverage dispensers*	40
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0072	Resolve problems in hydronic systems*	40
UEERA0073	Resolve problems in ice making systems*	20
UEERA0074	Resolve problems in industrial refrigeration systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0077	Resolve problems in transport refrigeration systems*	20
UEERA0078	Resolve problems in ultra-low temperature refrigeration systems*	20

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UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Group C: Qualification elective units.		Weighting Points
UEECO0001	Estimate electrotechnology projects	40
UEERA0080	Select basic commercial refrigeration system equipment, components and accessories*	40
UEERA0082	Select residential air conditioning system equipment, components and accessories*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE42911 Certificate IV in Refrigeration and Air-conditioning Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE43020 Certificate IV in Electrical Equipment and Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to manufacture, fit, assemble, erect, operate, test, fault find, alter, repair electrical equipment and includes electrical wiring work only if that work is associated with assembling, maintaining, terminating or altering the wiring between electrical components within a plant or machinery.

An electrical fitter is not authorised to install any electrical wiring systems within an electrical installation as prescribed by definitions contained in AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).

Electrical equipment means any appliance, article, accessory, wire, fitting, cable, conduit or apparatus that generates, uses, conveys or controls (or that is intended to generate, use, convey or control) electricity above extra-low voltage (ELV).

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE33020 Certificate III in Electrical Fitting

or

- a current Electrical Fitter Occupational License or its equivalent issued in an applicable Australian state or territory.

Packaging Rules

A total of **540 weighting points** comprising:

120 core weighting points listed below; **plus**

420 general elective weighting points from the general elective units listed below.

Choose a total of 420 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; between 0 and 200 **weighting points** can be taken from Group B; and between 220 and 420 can be taken from Group C (or all 420 elective **weighting points** can be taken from Group C).

Up to 60 weighting points of the general elective units Group A, may be selected, with

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appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20

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UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40

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UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0074	Wind electrical coils*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III ('t')*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60
UEEHA0012	Supervise repair and overhaul of explosion-protected	60

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	equipment type increased safety (Ex e)*	
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60
UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0037	Establish the basic operating conditions of vapour compression systems - appliances*	50

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UEERA0043	Find and rectify faults in appliance control systems and devices*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0063	Recover, pressure test, evacuate, charge and leak test refrigerants - appliances*	50
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0083	Service and repair microwave ovens*	40
UEERA0085	Service clothes washing machines and dryers*	40
UEERA0086	Service dishwasher machines*	40
UEERA0087	Service electrical heating appliances*	60
UEERA0088	Service gas heating appliances*	40
UEERA0089	Service refrigeration appliances*	60
UEERA0091	Service small electrical appliances and power tools*	60
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50

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UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Group C: General elective units		**Weighting Points**
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60

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UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE43011 Certificate IV in Electrical Equipment and Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE43120 Certificate IV in Energy Efficiency and Assessment

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to conduct a residential, office and retail dwellings residential and small-medium enterprises (SME) energy audit and to develop energy efficient strategies to reduce energy use in a range of energy services.

The qualification also addresses the environmental and legislative contexts with the fundamental energy audit methodology to develop the initiative and solutions of sustainability and financial viability.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **440 weighting points** comprising:

180 core weighting points listed below; **plus**

260 general elective weighting points from the general elective units listed below.

Choose a total of 260 **weighting points** elective units from the list below, of which between 0 and 120 **weighting points** can be taken from Group A; between 0 and 120 **weighting points** can be taken from Group B; and between 140 and 260 **weighting points** can be taken from Group C (or all electives units of 260 **weighting points** can be taken from Group C).

Up to 120 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training package Companion Volume Implementation Guide (CVIG), if not listed weighting

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points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0001	Estimate electrotechnology projects	40
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEIC0009	Develop an electrical integrated system interface for	20

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	access through a touch screen*	
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE43111 Certificate IV in Energy Efficiency and Assessment

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE43220 Certificate IV in Industrial Automation and Control

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, fault find, repair, maintain and commission systems and devices for measurement and recording of physical/chemical phenomenon and related process control systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1280 weighting points** comprising:

520 core weighting points listed below; **plus**

760 general elective weighting points from the general elective units listed below.

Choose a total of 760 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; and between 0 and 540 **weighting points** must be taken from Group B; and between 220 and 760 **weighting points** must be taken from Group C, or all 760 **weighting points** can be taken from Group C.

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECS0033	Use engineering applications software on personal computers	40
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEPOPS202	Apply quality systems to work	20
UEPOPS337	Maintain quality systems within the team*	20
UEPOPS416	Monitor implementation of quality control for production and maintenance*	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20

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BSBCUS401	Coordinate implementation of customer service strategies	40
BSBINN301	Promote innovation in a team environment	40
BSBINM401	Implement workplace information system	40
BSBLDR402	Lead effective workplace relationships	50
BSBLDR403	Lead team effectiveness	50
BSBLED401	Develop teams and individuals	40
BSBMGT402	Implement operational plan	40
BSBMGT403	Implement continuous improvement	40
BSBWOR404	Develop work priorities	40
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
TLILIC0003	Licence to operate a forklift truck	40
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0029	Set up and configure basic local area network (LAN)*	80

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UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40

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UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Group C: General elective units		**Weighting Points**
UEECS0023	Install and configure network systems for internetworking*	120
UEEIC0003	Assist in commissioning process and instrumentation control systems*	40
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80

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UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEEIC0044	Troubleshoot measuring and analysis systems*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE43211 Certificate IV in Industrial Automation and Control

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50120 Diploma of Computer Systems Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop, select, install, commission and maintain computer equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

140 core weighting points listed below; **plus**

1460 general elective weighting points from the general elective units listed below.

Choose a total of 1460 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; and between 0 and 880 **weighting points** must be taken from Group B; and between 0 and 580 **weighting points** must be taken from Group C; and between 580 and 1040 **weighting points** must be taken from Group D.

Up to 270 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECS0004	Commission industrial computer systems*	20
UEECS0025	Modify/redesign industrial computer systems*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
ICTTEN419	Implement and troubleshoot enterprise routers and switches	100
ICTTEN420	Design, install and configure an internetwork	100
ICTTEN421	Apply advanced routing protocols to network design	80

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ICTTEN422	Configure and troubleshoot advanced network switching	80
ICTTEN423	Install and maintain a wide area network	80
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40

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UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0019	Develop software solutions for microcontroller-based systems*	60

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UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40

Group C: Qualification elective units.		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and	40

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	equipment for electrotechnology projects	
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0014	Develop computer network services*	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0021	Install and administer UNIX/LINUX-based networked computers	80
UEECS0023	Install and configure network systems for internetworking*	120
UEECS0024	Integrate multiple computer operating systems on a client server local area network	80
UEECS0031	Set up, create and implement content for a web server*	120
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60

Group D: Qualification elective units.		**Weighting Points**
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0053	Write specifications for computer systems engineering projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0001	Administer computer networks	80

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UEECS0007	Design and implement network systems for internetworking	120
UEECS0016	Develop energy sector directory services*	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0001	Analyse the performance of wireless-based electronic communication systems*	40
UEEEC0010	Design and develop advanced digital systems	40
UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0017	Develop engineering solutions to analogue electronic problems*	80
UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0010	Develop and test code for microcontroller devices	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE50111 Diploma of Computer Systems Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50220 Diploma of Electrical and Instrumentation

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop, select, install, commission, maintain and diagnose faults/malfunctions on electrical, instrumentation and control equipment and systems. No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **760 weighting points** comprising:

680 core weighting points listed below; **plus**

80 general elective weighting points from the general elective units listed below.

Choose a total of 80 **weighting points** elective units from the list below, of which between 0 and 20 **weighting points** can be taken from Group A; between 0 and 20 **weighting points** can be taken from Group B; between 0 and 20 **weighting points** can be taken from Group C; and between 60 and 80 **weighting points** can be taken from Group D (or all elective 80 **weighting points** can be taken from Group D).

Up to 20 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly

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to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0060	Write specifications for electrotechnology engineering projects	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40

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UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40

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UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60

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UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Group D: General elective units		**Weighting Points**
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE50211 Diploma of Electrical and Instrumentation

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50320 Diploma of Electrical and Refrigeration and Air Conditioning

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to select, install, set up, test, commission, fault find, repair and maintain refrigeration, air conditioning and electrical systems and equipment in buildings and premises. This qualification contributes to the Refrigeration and Air Conditioning (RAC) Refrigerant Handing Licence.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning RAC equipment.

RAC Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Licence:

The achievement of this qualification meets Electrical Regulatory Authority Council (ERAC), or their successor's, Essential Performance Capabilities for an 'Unrestricted Electrician's license'.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1830 weighting points** comprising:

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1750 core weighting points listed below; **plus**

80 general elective weighting points from the general elective units listed below.

Choose a total of 80 **weighting points** elective units from the list below, of which between 0 and 20 **weighting points** can be taken from Group A; between 0 and 20 **weighting points** can be taken from Group B; between 0 and 20 **weighting points** can be taken from Group C; and between 40 and 80 **weighting points** must be taken from Group D (or all electives units of 80 **weighting points** can be taken from Group D).

Up to 20 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0044	Solve problems in multiple path circuits*	40
UEECD0046	Solve problems in single path circuits*	40

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UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0060	Write specifications for electrotechnology engineering projects	40
UEEEL0003	Arrange circuits, control and protection for electrical installations*	40
UEEEL0005	Develop and connect electrical control circuits*	80
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	20
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	20
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	20
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*	40
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*	60
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	60
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*	40
UEEEL0047	Identify, shut down and restart systems with alternate supplies*	20

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UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UETTDRRF06	Perform rescue from a live LV panel	20

Group A: Imported and common elective units	**Weighting Points**

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BSBOPS203	Deliver a service to customers	20
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEEEL0013	Install, set up and commission interval metering*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0073	Resolve problems in ice making systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

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Group C: Qualification elective units		**Weighting Points**
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20

Group D: Qualification elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEERA0040	Evaluate and report on the indoor air quality of buildings*	40

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE50311 Diploma of Electrical and Refrigeration and Air-conditioning

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50420 Diploma of Electrical Engineering

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification cover competencies to develop, select, commission, maintain and diagnose faults/malfunctions on advanced electrical equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **760 weighting points** comprising:

160 core weighting points listed below; **plus**

600 general elective weighting points from the general elective units listed below.

Choose a total of 600 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; between 0 and 100 **weighting points** can be taken from Group B; between 0 and 240 **weighting points** can be taken from Group C; and between 260 and 600 **weighting points** must be taken from Group D (or all elective units between 0 and 600 **weighting points** must can be taken from Group D).

Up to 270 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the

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qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0060	Write specifications for electrotechnology engineering projects	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
BSBINS501	Implement information and knowledge management systems	50
BSBSTR501	Establish innovative work environments	50
BSBLDR522	Manage people performance	70
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60
ICTICT214	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20

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UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20

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UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40

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UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UETTDRIS44	Perform HV field switching operation to a given schedule*	40

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UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60

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UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40

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UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0035	Design effective and efficient lighting for public, open and sports areas*	20
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60

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UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60
UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus*	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems*	60
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems*	60
UETTDRIS72	Diagnose and rectify faults in distributed generation systems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE50411 Diploma of Electrical Engineering

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50520 Diploma of Electronics and Communications Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop, select, commission, maintain and diagnose faults/malfunctions of electronic components/sub-assemblies, apparatus and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

140 core weighting points listed below; **plus**

1460 general elective weighting points from the general elective units listed below.

Choose a total of 1460 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; and between 0 and 920 **weighting points** must be taken from Group B; and between 260 and 580 **weighting points** must be taken from Group C; and between 280 and 1200 **weighting points** must be taken from Group D;

Up to 270 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEC0007	Commission electronics and communications systems	20
UEEEC0044	Modify - redesign electronics and communications systems*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBMGT502	Manage people performance	70
BSBINM501	Manage an information or knowledge management system	50
BSBMGT516	Facilitate continuous improvement	60
BSBINN502	Build and sustain an innovative work environment	50
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
ICTTEN312	Install telecommunications network equipment	40
MSS402001	Apply competitive systems and practices	20

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MSS402020	Apply quick changeover procedures	20
MSS402021	Apply Just in Time procedures	20
MSS402040	Apply 5S procedures	20
MSS402080	Undertake root cause analysis	20
MSS402081	Contribute to the application of a proactive maintenance strategy	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEEEC0046	Operate and maintain amateur radio communication stations*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0019	Fabricate, assemble and dismantle utilities industry	40

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	components*	
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0033	Use engineering applications software on personal computers	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data	40

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	communication cabling*	
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0008	Commission large fire protection systems*	40
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0029	Fault find and repair electronic apparatus*	40

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UEEEC0032	Fault find and repair high-volume office equipment*	120
UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40
UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0042	Install large security systems*	100
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0064	Solve oscillator problems*	40

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UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20

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Group C: Qualification elective units.		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0018	Establish, maintain and evaluate energy sector WHS/OHS systems	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEEEC0033	Fault find and repair navigation systems*	60
UEEEC0035	Fault find and repair satellite-based surveillance and observation systems*	60
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0031	Set up, create and implement content for a web server*	120
UEEEC0009	Commission satellite and microwave communication systems*	40
UEEEC0012	Design custom electronic equipment installations*	120
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0023	Diagnose and rectify faults in digital transmission circuits and systems*	80
UEEEC0024	Diagnose and rectify faults in electronic display circuits*	60
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0030	Fault find and repair electronic medical equipment*	120

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UEEEC0031	Fault find and repair global positioning systems*	60
UEEEC0034	Fault find and repair radar apparatus and systems*	120
UEEEC0036	Fault find and repair sonar apparatus and systems*	120
UEEEC0037	Fault find and repair telecommunication apparatus and systems*	60
UEEEC0051	Program and commission commercial video/audio systems*	40
UEEEC0052	Program and test large security systems*	120
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0012	Develop structured programs to control external devices*	40

Group D: Qualification elective units.		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0054	Write specifications for electronics and communications engineering projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0013	Develop and validate biometric equipment/systems installation	120

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UEECS0016	Develop energy sector directory services*	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0001	Analyse the performance of wireless-based electronic communication systems*	40
UEEEC0010	Design and develop advanced digital systems	40
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0016	Develop engineering solutions to RF amplifier problems*	40
UEEEC0017	Develop engineering solutions to analogue electronic problems*	80
UEEEC0018	Develop engineering solutions to audio electronic problems*	60
UEEEC0020	Develop solutions for air surveillance apparatus and systems*	120
UEEEC0021	Diagnose and rectify faults in air navigation circuits and systems*	120
UEEEC0053	Provide engineering solutions to air traffic control system problems*	40
UEEEC0054	Provide gate array solutions for complex electronics systems*	60
UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0010	Develop and test code for microcontroller devices	60

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Qualification Mapping Information

This qualification replaces and is equivalent to UEE50511 Diploma of Electronics and Communications Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50720 Diploma of Renewable Energy Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to develop, select, commission, maintain and diagnose faults/malfunctions on large-scale renewable energy (RE) equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **760 weighting points** comprising:

240 core weighting points listed below; **plus**

520 general elective weighting points from the general elective units listed below.

Choose a total of 520 **weighting points** elective units from the list below, of which between 0 and 260 **weighting points** can be taken from Group A; between 0 and 100 **weighting points** must be taken from Group B; between 0 and 240 **weighting points** must be taken from Group C; and between 260 and 340 **weighting points** must be taken from Group D.

Up to 260 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly

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to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0062	Write specifications for renewable energy engineering projects	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20

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UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0037	Install, configure and commission LV micro-hydro systems rated up to 6.4 kW*	20
UEERE0038	Install, configure and commission LV wind energy conversion systems rated up to 10 kW*	40
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20

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UEERE0045	Solve basic problems in micro-hydro systems*	20
UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERE5001	Design battery storage systems for grid-connected photovoltaic systems*	80

Group C: Qualification elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60

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UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE50711 Diploma of Renewable Energy Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE50920 Diploma of Industrial Electronics and Control Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop, select, commission, maintain and diagnose faults/malfunctions of equipment and systems for the monitoring and control of plant, machines and processes.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

OR

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **760 weighting points** comprising:

280 core weighting points listed below; **plus**

480 general elective weighting points from the general elective units listed below.

Choose a total of 480 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; between 0 and 100 **weighting points** can be taken from Group B; between 0 and 120 **weighting points** can be taken from Group C; and between 260 and 480 **weighting points** can be taken from Group D (or all minimum 480 **weighting points** can be taken from Group D).

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0055	Write specifications for industrial electronics and control projects	40
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20

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UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60

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UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECS0014	Develop computer network services*	120
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60

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UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Group D: General elective units		**Weighting Points**
UEECS0004	Commission industrial computer systems*	20
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0025	Modify/redesign industrial computer systems*	20
UEECS0031	Set up, create and implement content for a web server*	120
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE50911 Diploma of Industrial Electronics and Control Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE51020 Diploma of Instrumentation and Control Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to install, set up, test, develop, select, commission, maintain and diagnose faults/malfunctions of equipment and systems for the measurement, recording, monitoring and control of physical/chemical phenomenon and related process control systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

1120 core weighting points listed below; **plus**

480 general elective weighting points from the general elective units listed below.

Choose a total of 480 **weighting points** elective units from the list below, of which between 0 and 180 **weighting points** can be taken from Group A; and between 0 and 100 **weighting points** must be taken from Group B; and between 0 and 120 **weighting points** must be taken from Group C; and between 260 and 480 **weighting points** must be taken from Group D or all minimum 480 **weighting points** can be taken from Group D

Up to 180 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

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Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0055	Write specifications for industrial electronics and control projects	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and	20

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	associated equipment*	
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60

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BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0033	Set up gas analysis measuring and control instruments*	20
UEEIC0035	Set up scientific analysis measuring and control instruments*	20
UEEIC0036	Set up water analysis measuring and control instruments*	20

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UEEIC0037	Set up weighting measuring and control instruments*	20
UEEIC0045	Troubleshoot medical equipment control systems*	120
UEEIC0046	Troubleshoot process control systems*	60

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECS0014	Develop computer network services*	120
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0003	Assist in commissioning process and instrumentation control systems*	40
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0042	Solve problems in single phase electronic power	60

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	control circuits*	
UEEIC0044	Troubleshoot measuring and analysis systems*	40

Group D: General elective units		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0004	Commission industrial computer systems*	20
UEECS0012	Design embedded controller control systems	80
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0025	Modify/redesign industrial computer systems*	20
UEECS0031	Set up, create and implement content for a web server*	120
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE51011 Diploma of Instrumentation and Control Engineering

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE51120 Diploma of Engineering Technology - Refrigeration and Air Conditioning

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop systems and select equipment for heating, ventilation, air conditioning and/or refrigeration systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

920 core weighting points listed below; **plus**

680 general elective weighting points from the general elective units listed below.

Choose a total of 680 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; and between 0 and 100 **weighting points** must be taken from Group B; and between 60 and 170 **weighting points** must be taken from Group C; and between 270 and 620 **weighting points** must be taken from Group D.

Up to 270 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0022	Identify building techniques, methods and materials used in energy sector work activities*	40
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEERA0001	Analyse the operation of HVAC air and hydronic systems*	80
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0003	Analyse the thermodynamic performance of HVAC/R systems	50
UEERA0028	Determine noise and vibration encountered in HVAC/R applications*	80
UEERA0034	Establish heat loads for commercial refrigeration and/or air conditioning applications*	80
UEERA0038	Establish the thermodynamic parameters of refrigeration and air conditioning systems*	80
UEERA0042	Evaluate thermodynamic and fluid parameters of refrigeration systems*	100
UEERA0061	Produce HVAC/R system design drawings*	80

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UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
CPCCWHS1001	Prepare to work safely in the construction industry	10
CPPBDN5013A	Develop and collaborate on building information models for small-scale building design projects	100
HLTAID001	Provide cardiopulmonary resuscitation	10
ICTICT203	Operate application software packages	20
MEM16006	Organise and communicate information*	20
MEM16008	Interact with computing technology*	20
MEM30031A	Operate computer-aided design (CAD) system to produce basic drawing elements	40
MEM30032A	Produce basic engineering drawings	80
MEM30033A	Use computer-aided design (CAD) to create and display 3-D models*	40
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECS0033	Use engineering applications software on personal computers	40
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10

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UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0081	Select refrigerant piping, accessories and associated controls*	40

Group C: Qualification elective units.		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEERA0060	Produce HVAC/R control system diagrams*	40
UEERA0080	Select basic commercial refrigeration system equipment, components and accessories*	40
UEERA0082	Select residential air conditioning system equipment, components and accessories*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units.		**Weighting Points**
UEECD0041	Solve electrotechnical engineering problems	60
UEECD0048	Undertake computations in an energy sector environment	120
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEERA0014	Design ammonia refrigerated systems*	40
UEERA0015	Design carbon dioxide refrigerated systems*	40
UEERA0016	Design commercial refrigeration systems and select components*	80
UEERA0021	Design control systems for refrigeration or heating, ventilation and air conditioning systems*	80

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UEERA0022	Design heating, ventilation and air conditioning (HVAC) systems and select components*	60
UEERA0023	Design hydrocarbon refrigerated systems*	40
UEERA0025	Design industrial refrigeration systems and select components*	80
UEERA0027	Design secondary refrigerant systems*	40
UEERA0039	Evaluate and report on building services energy management systems*	80
UEERA0040	Evaluate and report on the indoor air quality of buildings*	40
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE51111 Diploma of Engineering Technology - Refrigeration and Air-conditioning

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE51220 Diploma of Air Conditioning and Refrigeration Engineering

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop systems; select equipment; and commission, maintain and diagnose faults/malfunctions of refrigeration systems and equipment that apply to commercial food storage and preservation and air conditioning and air distribution equipment and special applications. It includes regulatory requirements for purchasing and handling refrigerants.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments. Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

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Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **1670 weighting points** comprising:

1540 core weighting points listed below; **plus**

130 general elective weighting points from the general elective units listed below.

Choose a total of 130 **weighting points** elective units from the list below, of which between 0 and 60 **weighting points** can be taken from Group A; and between 0 and 30 **weighting points** can be taken from Group B; and between 0 and 50 **weighting points** can be taken from Group C; and between 50 and 130 **weighting points** must be taken from Group D; or all electives units of 130 **weighting points** can be taken from Group D.

Up to 60 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and	20

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	procedures	
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0033	Use engineering applications software on personal computers	40
UEERA0001	Analyse the operation of HVAC air and hydronic systems*	80
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0034	Establish heat loads for commercial refrigeration and/or air conditioning applications*	80
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0038	Establish the thermodynamic parameters of refrigeration and air conditioning systems*	80
UEERA0042	Evaluate thermodynamic and fluid parameters of refrigeration systems*	100
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80

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UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBLDR522	Manage people performance	70
BSBINS501	Implement information and knowledge management systems	50
BSBSTR502	Facilitate continuous improvement	60
BSBSTR501	Establish innovative work environments	50

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BSBTWK502	Manage team effectiveness	60
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
MEM16006	Organise and communicate information*	20
MEM16008	Interact with computing technology*	20
MEM30031A	Operate computer-aided design (CAD) system to produce basic drawing elements	40
MEM30032A	Produce basic engineering drawings	80
MEM30033A	Use computer-aided design (CAD) to create and display 3-D models*	40

Group B: Qualification elective units.		**Weighting Points**
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10
UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment*	20
UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment*	20
UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems*	20
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0065	Repair and service ammonia refrigeration systems*	20
UEERA0066	Repair and service carbon dioxide refrigeration systems*	20
UEERA0067	Repair and service secondary refrigeration systems*	20

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UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0069	Resolve problems in beverage dispensers*	40
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0071	Resolve problems in dairy refrigeration systems*	20
UEERA0072	Resolve problems in hydronic systems*	40
UEERA0073	Resolve problems in ice making systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0077	Resolve problems in transport refrigeration systems*	20
UEERA0078	Resolve problems in ultra-low temperature refrigeration systems*	20
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0001	Estimate electrotechnology projects	40
UEERA0060	Produce HVAC/R control system diagrams*	40
UEERA0061	Produce HVAC/R system design drawings*	80
UEERA0080	Select basic commercial refrigeration system equipment, components and accessories*	40

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UEERA0082	Select residential air conditioning system equipment, components and accessories*	40

Group D: Qualification elective units.		**Weighting Points**
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEERA0014	Design ammonia refrigerated systems*	40
UEERA0015	Design carbon dioxide refrigerated systems*	40
UEERA0016	Design commercial refrigeration systems and select components*	80
UEERA0021	Design control systems for refrigeration or heating, ventilation and air conditioning systems*	80
UEERA0022	Design heating, ventilation and air conditioning (HVAC) systems and select components*	60
UEERA0023	Design hydrocarbon refrigerated systems*	40
UEERA0025	Design industrial refrigeration systems and select components*	80
UEERA0027	Design secondary refrigerant systems*	40
UEERA0028	Determine noise and vibration encountered in HVAC/R applications*	80
UEERA0039	Evaluate and report on building services energy management systems*	80
UEERA0040	Evaluate and report on the indoor air quality of buildings*	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE51211 Diploma of Air-conditioning and Refrigeration Engineering

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE53020 Diploma of Electrical Systems Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to develop, select, commission, maintain and diagnose faults/malfunctions on advanced electrical equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE33020 Certificate III in Electrical Fitting

or

- a current Electrical Fitter Occupational License or its equivalent issued in an applicable Australian state or territory.

Packaging Rules

A total of **800 weighting points** comprising:

160 core weighting points listed below; **plus**

640 general elective weighting points from the general elective units listed below.

Choose a total of 600 **weighting points** elective units from the list below, of which between 0 and 270 **weighting points** can be taken from Group A; between 0 and 140 **weighting points** can be taken from Group B; between 0 and 240 **weighting points** can be taken from Group C; and between 260 and 640 **weighting points** can be taken from Group D (or all elective units between 0 and 640 **weighting points** can be taken from Group D).

Up to 270 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of

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competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0059	Write specifications for electrical engineering projects	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
UEECD0011	Comply with scheduled and preventative maintenance program processes	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20

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UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0050	Use and maintain the integrity of a portable gas detection device*	20
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0001	Assemble and connect telecommunication frames and cabinets*	60
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20

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UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0074	Wind electrical coils*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III ('t')*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60

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UEEHA0012	Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)*	60
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60
UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0037	Establish the basic operating conditions of vapour compression systems - appliances*	50

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UEERA0043	Find and rectify faults in appliance control systems and devices*	60
UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0049	Install and start up single head split air conditioning and water heating heat pump systems*	70
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0062	Recover and charge refrigerants*	40
UEERA0063	Recover, pressure test, evacuate, charge and leak test refrigerants - appliances*	50
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0083	Service and repair microwave ovens*	40
UEERA0085	Service clothes washing machines and dryers*	40
UEERA0086	Service dishwasher machines*	40
UEERA0087	Service electrical heating appliances*	60
UEERA0088	Service gas heating appliances*	40
UEERA0089	Service refrigeration appliances*	60
UEERA0091	Service small electrical appliances and power tools*	60
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERS0001	Assemble and wire internal electrical rail signalling equipment*	30
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50

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UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Group C: General elective units		**Weighting Points**
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0007	Plan electrical installations for hazardous areas*	20

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UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0035	Design effective and efficient lighting for public, open	20

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	and sports areas*	
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus*	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems*	60
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems*	60
UETTDRIS72	Diagnose and rectify faults in distributed generation systems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE53011 Diploma of Electrical Systems Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE60220 Advanced Diploma of Electronics and Communications Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate electronics and communication equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **2160 weighting points** comprising**:**

280 core weighting points listed below; **plus**

1880 general elective weighting points from the general elective units listed below.

Choose a total of 1880 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; and between 0 and 900 **weighting points** must be taken from Group B; and between 0 and 280 **weighting points** must be taken from Group C; and between 0 and 260 **weighting points** must be taken from Group D; and between 520 and 1320 **weighting points** must be taken from Group E.

Up to 360 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

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Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEEEC0007	Commission electronics and communications systems	20
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0043	Manage computer systems/electronics projects	40
UEEEC0044	Modify - redesign electronics and communications systems*	20
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60

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ICTTEN312	Install telecommunications network equipment	40
MSS402001	Apply competitive systems and practices	20
MSS402020	Apply quick changeover procedures	20
MSS402021	Apply Just in Time procedures	20
MSS402040	Apply 5S procedures	20
MSS402080	Undertake root cause analysis	20
MSS402081	Contribute to the application of a proactive maintenance strategy	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40

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UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40

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UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0013	Solve problems in voice and data communications circuits*	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0002	Assemble and install reception antennae and signal distribution equipment*	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0008	Commission large fire protection systems*	40
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0026	Enter and verify programs for fire protection systems*	40
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0032	Fault find and repair high-volume office equipment*	120
UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40
UEEEC0039	Install and test microwave antennae and waveguides*	60
UEEEC0040	Install commercial video/audio system components*	120
UEEEC0041	Install fire detection and warning system apparatus*	40
UEEEC0042	Install large security systems*	100

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UEEEC0046	Operate and maintain amateur radio communication stations*	40
UEEEC0048	Program and commission commercial access control security systems*	60
UEEEC0049	Program and commission commercial security closed-circuit television systems*	60
UEEEC0050	Program and commission commercial security systems*	60
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0061	Set up and adjust commercial radio frequency (RF) transmission and reception systems*	60
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0064	Solve oscillator problems*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0069	Troubleshoot digital sub-systems*	80

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UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0071	Troubleshoot fire protection systems*	40
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0073	Troubleshoot professional audio reproduction components*	120
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEC0076	Verify compliance and functionality of fire protection system installations*	60
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0018	Establish, maintain and evaluate energy sector WHS/OHS systems	60

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UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0031	Set up, create and implement content for a web server*	120
UEEEC0009	Commission satellite and microwave communication systems*	40
UEEEC0012	Design custom electronic equipment installations*	120
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0023	Diagnose and rectify faults in digital transmission circuits and systems*	80
UEEEC0024	Diagnose and rectify faults in electronic display circuits*	60
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0030	Fault find and repair electronic medical equipment*	120
UEEEC0031	Fault find and repair global positioning systems*	60
UEEEC0033	Fault find and repair navigation systems*	60
UEEEC0034	Fault find and repair radar apparatus and systems*	120
UEEEC0035	Fault find and repair satellite-based surveillance and observation systems*	60
UEEEC0036	Fault find and repair sonar apparatus and systems*	120
UEEEC0037	Fault find and repair telecommunication apparatus and systems*	60

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UEEEC0051	Program and commission commercial video/audio systems*	40
UEEEC0052	Program and test large security systems*	120
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units.		**Weighting Points**
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0054	Write specifications for electronics and communications engineering projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0013	Develop and validate biometric equipment/systems installation	120
UEECS0016	Develop energy sector directory services*	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0001	Analyse the performance of wireless-based electronic	40

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	communication systems*	
UEEEC0010	Design and develop advanced digital systems	40
UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0016	Develop engineering solutions to RF amplifier problems*	40
UEEEC0017	Develop engineering solutions to analogue electronic problems*	80
UEEEC0018	Develop engineering solutions to audio electronic problems*	60
UEEEC0020	Develop solutions for air surveillance apparatus and systems*	120
UEEEC0021	Diagnose and rectify faults in air navigation circuits and systems*	120
UEEEC0053	Provide engineering solutions to air traffic control system problems*	40
UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0010	Develop and test code for microcontroller devices	60

Group E: Qualification elective units.		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0015	Develop engineering solutions to photonic system problems*	80

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UEECD0026	Manage risk in electrotechnology activities	60
UEECD0041	Solve electrotechnical engineering problems	60
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEECS0012	Design embedded controller control systems	80
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEC0047	Plan large electronic projects	60
UEEEC0054	Provide gate array solutions for complex electronics systems*	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0008	Design electronic control systems*	60
UEEIC0032	Set up electronically controlled robotically operated complex systems*	80

Qualification Mapping Information

This qualification replaces and is equivalent to UEE60211 Advanced Diploma of Electronics and Communications Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE60420 Advanced Diploma of Computer Systems Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design, install/validate/evaluate and administer computer equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **2160 weighting points** comprising:

280 core weighting points listed below; **plus**

1880 general elective weighting points from the general elective units listed below.

Choose a total of 1880 **weighting points** elective units from the list below, of which between 0 and 1080 **weighting points** can be taken from Group A; and between 800 and 1880 **weighting points** must be taken from Group B.

Up to 360 weighting points of the general elective units Group A, may be selected from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

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Core units		**Weighting Points**
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECS0004	Commission industrial computer systems*	20
UEECS0025	Modify/redesign industrial computer systems*	20
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0043	Manage computer systems/electronics projects	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTTEN419	Implement and troubleshoot enterprise routers and switches	100

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ICTTEN420	Design, install and configure an internetwork	100
ICTTEN421	Apply advanced routing protocols to network design	80
ICTTEN422	Configure and troubleshoot advanced network switching	80
ICTTEN423	Install and maintain a wide area network	80
UEEAS0001	Assemble electronic components*	40
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECO0001	Estimate electrotechnology projects	40

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UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0001	Administer computer networks	80
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0014	Develop computer network services*	120
UEECS0018	Develop web pages for engineering applications	40
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0021	Install and administer UNIX/LINUX-based networked computers	80
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0023	Install and configure network systems for internetworking*	120
UEECS0024	Integrate multiple computer operating systems on a client server local area network	80
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEECS0031	Set up, create and implement content for a web server*	120
UEECS0032	Support computer hardware and software for engineering applications	120
UEECS0033	Use engineering applications software on personal computers	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to	80

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	telecommunication services*	
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80

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UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0041	Solve electrotechnical engineering problems	60
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECD0053	Write specifications for computer systems engineering projects	40
UEECO0003	Manage contract variations	40

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UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0005	Design and implement advanced routing for internetworking systems	100
UEECS0006	Design and implement multi-layer switching for internetworking systems	100
UEECS0007	Design and implement network systems for internetworking	120
UEECS0008	Design and implement remote access for internetworking systems	100
UEECS0009	Design and implement security for internetworking systems	100
UEECS0010	Design and implement wireless LANs/WANs for internetworking systems	100
UEECS0011	Design and manage enterprise computer networks	80
UEECS0012	Design embedded controller control systems	80
UEECS0013	Develop and validate biometric equipment/systems installation	120
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEECS0016	Develop energy sector directory services*	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0026	Plan industrial computer systems projects	60
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0001	Analyse the performance of wireless-based electronic communication systems*	40
UEEEC0010	Design and develop advanced digital systems	40

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UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0017	Develop engineering solutions to analogue electronic problems*	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEC0054	Provide gate array solutions for complex electronics systems*	60
UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0010	Develop and test code for microcontroller devices	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE60411 Advanced Diploma of Computer Systems Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE60620 Advanced Diploma of Industrial Electronics and Control Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate control equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

OR

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1320 weighting points** comprising:

960 core weighting points listed below; **plus**

360 general elective weighting points from the general elective units listed below.

Choose a total of 360 **weighting points** elective units from the list below, of which between 0 and 180 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; between 0 and 100 **weighting points** can be taken from Group C; between 0 and 60 **weighting points** can be taken from Group D; and between 160 and 360 **weighting points** can be taken from Group E (or all minimum 360 **weighting points** can be taken from Group E).

Up to 180 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0055	Write specifications for industrial electronics and control projects	40
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECS0033	Use engineering applications software on personal computers	40

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UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0049	Manage instrumentation and control projects*	40
UEEIC0050	Plan instrumentation and control projects*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60

Group B: General elective units		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40

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UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40

Group C: General elective units	**Weighting Points**

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UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60

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UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60

Group E: General elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20

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UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEL0041	Develop engineering solution for synchronous machine and control problems*	60
UEEEL0042	Develop engineering solutions for d.c. machine and control problems*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEHA0008	Design gas detection systems	20
UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0008	Design electronic control systems*	60
UEEIC0032	Set up electronically controlled robotically operated complex systems*	80

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE60611 Advanced Diploma of Industrial Electronics and Control Engineering

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE60920 Advanced Diploma of Renewable Energy Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies to design and validate/evaluate renewable energy (RE) equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1320 weighting points** comprising:

980 core weighting points listed below; **plus**

340 general elective weighting points from the general elective units listed below.

Choose a total of 340 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; between 0 and 100 **weighting points** can be taken from Group C; between 0 and 60 **weighting points** can be taken from Group D; and between 160 and 340 **weighting points** can be taken from Group E (or all elective units of 340 weighting points can be taken from Group E).

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0062	Write specifications for renewable energy engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40

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UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0042	Manage renewable energy (RE) projects	40
UEERE0044	Plan renewable energy (RE) projects	60
UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60

Group A: Imported and common elective units		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60

Group B: Qualification elective units		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

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UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0037	Install, configure and commission LV micro-hydro systems rated up to 6.4 kW*	20
UEERE0038	Install, configure and commission LV wind energy conversion systems rated up to 10 kW*	40
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0045	Solve basic problems in micro-hydro systems*	20
UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60

Group C: Qualification elective units		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0050	Install and replace low voltage current transformer metering*	20

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UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20

Group D: Qualification elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0035	Design effective and efficient lighting for public, open and sports areas*	20
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40

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UEEIC0010	Develop and test code for microcontroller devices	60
UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60
UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60

Group E: Qualification elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0029	Plan electrotechnology projects	60
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECD0057	Manage electrotechnology projects	40
UEECO0003	Manage contract variations	40
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEERE0010	Design energy management controls for electrical installations in buildings*	80
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60
UEERE0028	Design hybrid renewable power systems*	80
UEERE0031	Design stand-alone renewable energy (RE) systems*	40
UEERE0033	Develop engineering solutions to renewable energy (RE) problems*	60

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Qualification Mapping Information

This qualification replaces and is not equivalent to UEE60911 Advanced Diploma of Renewable Energy Engineering

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE61220 Advanced Diploma of Engineering - Explosion protection

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to assess and manage risk associated with hazardous areas, design and validate/evaluate explosion-protection aspects of electrical and instrument systems, audit explosion-protected installations and provide explosion-protection technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

OR

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1220 weighting points** comprising:

840 core weighting points listed below; **plus**

380 general elective weighting points from the general elective units listed below.

Choose a total of 380 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; between 0 and 80 **weighting points** can be taken from Group C; between 0 and 60 **weighting points** can be taken from Group D; and between 160 and 380 **weighting points** can be taken from Group E (or all elective **weighting points** can be taken from Group E).

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology

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Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40

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UEEEL0015	Manage large electrical projects*	40
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
PMASUP410	Develop plant documentation	30

Group B: General elective units		**Weighting Points**
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical	40

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	installations for hazardous areas*	
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEHA0007	Plan electrical installations for hazardous areas*	20

Group E: General elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEEEL0041	Develop engineering solution for synchronous machine and control problems*	60

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UEEEL0042	Develop engineering solutions for d.c. machine and control problems*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEHA0008	Design gas detection systems	20
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III ('t')*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60
UEEHA0012	Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)*	60
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60
UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE61211 Advanced Diploma of Engineering - Explosion protection

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE61521 Advanced Diploma of Instrumentation and Control Engineering

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package.

Qualification Description

This qualification covers competencies to design and validate and/or evaluate process control equipment and systems, manage risk, estimate and manage projects and provide technical advice or sales. It also provides competencies to install, set up, test, develop, select, commission, maintain, and diagnose faults or malfunctions of equipment and systems.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

1740 core weighting points listed below; **plus**

420 general elective weighting points from the general elective units listed below.

Choose a total of 420 **weighting points** elective units from the list below, of which between 0 and 170 **weighting points** can be taken from Group A; and between 0 and 80 **weighting points** can be taken from Group B; and between 0 and 80 **weighting points** can be taken from Group C; and between 0 and 80 **weighting points** can be taken from Group D; and between 180 and 420 **weighting points** must be taken from Group E; or all 420 **weighting points** can be taken from Group E

Up to 170 weighting points of the general elective units Group A, may be selected from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with.

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A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0043	Solve problems in direct current circuits*	80
UEECD0045	Solve problems in multiple path extra-low voltage (ELV) a.c. circuits*	40

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UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0055	Write specifications for industrial electronics and control projects	40
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECS0033	Use engineering applications software on personal computers	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0021	Find and rectify faults in process final control elements*	40
UEEIC0022	Install instrumentation and control apparatus and associated equipment*	20
UEEIC0023	Install instrumentation and control cabling and tubing*	20
UEEIC0029	Set up and adjust PID control loops*	40
UEEIC0030	Set up and adjust advanced PID process control loops*	40
UEEIC0031	Set up and configure human-machine interface (HMI) and industrial networks*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40

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UEEIC0048	Verify compliance and functionality of instrumentation and control installations*	40
UEEIC0049	Manage instrumentation and control projects*	40
UEEIC0050	Plan instrumentation and control projects*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60

Group A: Imported and common elective units		**Weighting Points**
BSBINS501	Implement information and knowledge management systems	50
BSBLDR522	Manage people performance	70
BSBSTR501	Establish innovative work environments	50
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60

Group B: General elective units		**Weighting Points**
ICTICT214	Operate application software packages	20
UEEEL0007	Develop detailed electrical drawings*	60
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40

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UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0004	Calibrate, adjust and test measuring instruments*	40
UEEIC0033	Set up gas analysis measuring and control instruments*	20
UEEIC0035	Set up scientific analysis measuring and control instruments*	20
UEEIC0036	Set up water analysis measuring and control instruments*	20
UEEIC0037	Set up weighting measuring and control instruments*	20
UEEIC0045	Troubleshoot medical equipment control systems*	120
UEEIC0046	Troubleshoot process control systems*	60

Group C: General elective units		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECO0001	Estimate electrotechnology projects	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEIC0003	Assist in commissioning process and instrumentation control systems*	40
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

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UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEEIC0044	Troubleshoot measuring and analysis systems*	40

Group D: General elective units		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0004	Commission industrial computer systems*	20
UEECS0014	Develop computer network services*	120
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0025	Modify/redesign industrial computer systems*	20
UEECS0031	Set up, create and implement content for a web server*	120
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60

Group E: General elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20

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UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEHA0008	Design gas detection systems	20
UEEIC0006	Design and configure Human-Machine Interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120

Qualification Mapping Information

This qualification replaces and is equivalent to UEE61511 Advanced Diploma of Instrumentation and Control Engineering

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE61720 Advanced Diploma of Engineering Technology - Electronics

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate electronics and/or communication equipment and systems and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **2160 weighting points** comprising:

1160 core weighting points listed below; **plus**

1000 general elective weighting points from the general elective units listed below.

Choose a total of 1000 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; and between 0 and 200 **weighting points** must be taken from Group B; and between 0 and 200 **weighting points** must be taken from Group C; and between 0 and 300 **weighting points** must be taken from Group D; and between 280 and 900 **weighting points** must be taken from Group E.

Up to 360 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0011	Design and develop electronics/computer systems projects	40

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UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0063	Solve fundamental electronic communications system problems*	40
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60
ICTICT203	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

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Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40
UEEAS0002	Conduct quality and functional tests on assembled electronic apparatus*	20
UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0005	Set up and check electronic component assembly machines*	40
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0008	Carry out preparatory energy sector work activities*	60
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0032	Support computer hardware and software for engineering applications	120
UEEDV0004	Install and connect data and voice communication equipment*	40

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UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40
UEEDV0011	Set up and configure basic data communication systems*	40
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEDV0014	Test, report and rectify faults in data and voice installations*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0004	Assemble and set up fixed video/audio components and systems in buildings and premises*	120
UEEEC0006	Carry out repairs of predictable faults in video and audio replay/recording apparatus*	120
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0028	Fault find and repair complex power supplies*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0038	Find and repair microwave amplifier section faults in electronic apparatus*	40
UEEEC0046	Operate and maintain amateur radio communication stations*	40

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UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0056	Repair predictable faults in audio components*	40
UEEEC0057	Repair predictable faults in general electronic apparatus*	40
UEEEC0058	Repair predictable faults in television receivers*	120
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0062	Set up and test residential video/audio equipment*	40
UEEEC0064	Solve oscillator problems*	40
UEEEC0068	Troubleshoot communication systems*	80
UEEEC0070	Troubleshoot faults in television receivers*	120
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0077	Verify functionality and compliance of custom electronic installations*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group C: Qualification elective units.		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0014	Develop computer network services*	120
UEECS0021	Install and administer UNIX/LINUX-based networked computers	80

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UEECS0023	Install and configure network systems for internetworking*	120
UEECS0024	Integrate multiple computer operating systems on a client server local area network	80
UEECS0030	Set up, configure and test biometric devices	40
UEEEC0012	Design custom electronic equipment installations*	120
UEEEC0015	Develop basic plans for integrating security systems*	40
UEEEC0022	Diagnose and rectify faults in camera circuits and equipment*	60
UEEEC0024	Diagnose and rectify faults in electronic display circuits*	60
UEEEC0025	Diagnose and rectify faults in recording and replay equipment	60
UEEEC0037	Fault find and repair telecommunication apparatus and systems*	60
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

Group D: Qualification elective units.		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0053	Write specifications for computer systems engineering projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects*	60

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UEECS0001	Administer computer networks	80
UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0004	Commission industrial computer systems*	20
UEECS0013	Develop and validate biometric equipment/systems installation	120
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0025	Modify/redesign industrial computer systems*	20
UEECS0031	Set up, create and implement content for a web server*	120
UEEEC0001	Analyse the performance of wireless-based electronic communication systems*	40
UEEEC0010	Design and develop advanced digital systems	40
UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0016	Develop engineering solutions to RF amplifier problems*	40
UEEEC0018	Develop engineering solutions to audio electronic problems*	60
UEEEC0054	Provide gate array solutions for complex electronics systems*	60
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60

Group E: Qualification elective units.		**Weighting Points**
UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECS0005	Design and implement advanced routing for internetworking systems	100

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UEECS0006	Design and implement multi-layer switching for internetworking systems	100
UEECS0007	Design and implement network systems for internetworking	120
UEECS0008	Design and implement remote access for internetworking systems	100
UEECS0009	Design and implement security for internetworking systems	100
–	Design and implement wireless LANs/WANs for internetworking systems	100
UEECS0011	Design and manage enterprise computer networks	80
UEECS0012	Design embedded controller control systems	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEC0047	Plan large electronic projects	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120

Qualification Mapping Information

This qualification replaces and is equivalent to UEE61711 Advanced Diploma of Engineering Technology - Electronics

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE61820 Advanced Diploma of Engineering Technology - Computer Systems

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design, install/validate/evaluate and administer computer and network-based systems and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

1160 core weighting points listed below; **plus**

1000 general elective weighting points from the general elective units listed below.

Choose a total of 1000 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; and between 0 and 200 **weighting points** must be taken from Group B; and between 0 and 200 **weighting points** must be taken from Group C; and between 0 and 300 **weighting points** must be taken from Group D; and between 280 and 1000 **weighting points** must be taken from Group E; or all 1000 weighting points can be taken from Group E.

Up to 360 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

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Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0027	Participate in development and follow a personal competency development plan	20
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0003	Assemble, set up and test computing devices*	80
UEECS0023	Install and configure network systems for internetworking*	120
UEECS0032	Support computer hardware and software for	120

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	engineering applications	
UEECS0033	Use engineering applications software on personal computers	40
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0069	Troubleshoot digital sub-systems*	80
UEEEC0074	Troubleshoot resonance circuits in an electronic apparatus*	80
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBWOR502	Lead and manage team effectiveness	60
BSBMGT516	Facilitate continuous improvement	60
ICTICT203	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEEAS0001	Assemble electronic components*	40

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UEEAS0003	Modify electronic sub-assemblies*	40
UEEAS0004	Select electronic components for assembly*	20
UEEAS0006	Use lead-free soldering techniques*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0021	Identify and select components, accessories and materials for energy sector work activities*	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0040	Solve basic problems electronic and digital equipment and circuits*	80
UEECS0018	Develop web pages for engineering applications	40
UEECS0022	Install and configure a client computer operating system and software	40
UEECS0028	Select, install, configure and test multimedia components	40
UEECS0029	Set up and configure basic local area network (LAN)*	80
UEECS0030	Set up, configure and test biometric devices	40
UEEDV0004	Install and connect data and voice communication equipment*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0006	Install and modify optical fibre performance data communication cabling*	40
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEDV0009	Select and arrange data and voice equipment for local area networks*	40
UEEDV0010	Select and arrange equipment for wireless communication networks*	40

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UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0019	Develop software solutions for microcontroller-based systems*	60
UEEEC0027	Enter instructions and test wired and wireless security systems*	40
UEEEC0029	Fault find and repair electronic apparatus*	40
UEEEC0042	Install large security systems*	100
UEEEC0055	Repair basic computer equipment faults by replacement of modules/sub-assemblies*	40
UEEEC0059	Repair routine business equipment faults*	120
UEEEC0065	Solve problems in basic electronic circuits*	100
UEEEC0066	Troubleshoot amplifiers in an electronic apparatus*	80
UEEEC0067	Troubleshoot basic amplifier circuits*	40
UEEEC0072	Troubleshoot microcontroller-based hardware systems	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEECS0001	Administer computer networks	80

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UEECS0002	Analyse and implement biometric measuring techniques and applications	120
UEECS0020	Evaluate and modify object-oriented code programs	40
UEECS0021	Install and administer UNIX/LINUX-based networked computers	80
UEECS0024	Integrate multiple computer operating systems on a client server local area network	80
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units.		**Weighting Points**
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0053	Write specifications for computer systems engineering projects	40
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0013	Develop and validate biometric equipment/systems installation	120
UEECS0014	Develop computer network services*	120
UEECS0016	Develop energy sector directory services*	80
UEECS0019	Develop, implement and test object-oriented code*	140
UEECS0031	Set up, create and implement content for a web server*	120
UEEEC0001	Analyse the performance of wireless-based electronic communication systems*	40
UEEEC0013	Design electronic printed circuit boards*	40
UEEEC0017	Develop engineering solutions to analogue electronic problems*	80
UEEEC0054	Provide gate array solutions for complex electronics systems*	60

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Group E: Qualification elective units.		**Weighting Points**
UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECS0005	Design and implement advanced routing for internetworking systems	100
UEECS0006	Design and implement multi-layer switching for internetworking systems	100
UEECS0007	Design and implement network systems for internetworking	120
UEECS0008	Design and implement remote access for internetworking systems	100
UEECS0009	Design and implement security for internetworking systems	100
UEECS0010	Design and implement wireless LANs/WANs for internetworking systems	100
UEECS0011	Design and manage enterprise computer networks	80
UEECS0012	Design embedded controller control systems	80
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0026	Plan industrial computer systems projects	60
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0010	Design and develop advanced digital systems	40
UEEEC0014	Design signal-conditioning sub-systems	80

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UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80

Qualification Mapping Information

This qualification replaces and is equivalent to UEE61811 Advanced Diploma of Engineering Technology - Computer Systems

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62020 Advanced Diploma of Engineering Technology - Renewable Energy

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification provides competencies in preparation to design and validate/evaluate renewable energy (RE) equipment and systems and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **2160 weighting points** comprising:

1260 core weighting points listed below; **plus**

900 general elective weighting points from the general elective units listed below.

Choose a total of 900 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; between 0 and 240 **weighting points** can be taken from Group B; between 0 and 220 **weighting points** can be taken from Group C; between 0 and 220 **weighting points** can be taken from Group D; and between 280 and 320 **weighting points** can be taken from Group E.

Up to 170 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided that selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits*	40
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0062	Write specifications for renewable energy engineering projects	40

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UEECS0033	Use engineering applications software on personal computers	40
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UEERE0025	Carry out basic repairs to renewable energy (RE) apparatus*	80
UEERE0034	Diagnose and rectify faults in renewable energy (RE) control systems*	60
UEERE0042	Manage renewable energy (RE) projects	40
UEERE0044	Plan renewable energy (RE) projects	60
UEERE0046	Solve problems in stand-alone renewable energy (RE) systems*	60

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60

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ICTICT203	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEERE0017	Maintain and repair facilities associated with remote area essential service operations*	120
UEERE0024	Attend to breakdowns in remote area power supplies (RAPS)*	20
UEERE0026	Conduct checks in the demand side use of remote area power supplies (RAPS)*	40
UEERE0035	Install ELV stand-alone photovoltaic power systems*	60
UEERE0036	Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications*	20
UEERE0039	Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW*	20
UEERE0041	Maintain operation of remote area power generation plant*	120
UEERE0043	Plan periodic maintenance schedules of remote area power supplies (RAPS)*	40
UEERE0045	Solve basic problems in micro-hydro systems*	20

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UEERE0047	Solve problems in wind energy conversion systems (WECS) rated up to 10 kW*	60
UEERE0048	Verify compliance and functionality of an extra-low voltage renewable energy installation*	40
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies*	20

Group C: Qualification elective units.		**Weighting Points**
UEECD0032	Produce detailed electrotechnology/utilities drawings using CAD equipment and software*	60
UEECD0047	Supervise and coordinate energy sector work activities	40
UEECO0001	Estimate electrotechnology projects	40
UEECO0013	Prepare specifications for the supply of materials and equipment for electrotechnology projects	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0027	Coordinate maintenance of renewable energy (RE) apparatus and systems*	20

Group D: Qualification elective units.		**Weighting Points**
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60

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UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60

Group E: Qualification elective units.		**Weighting Points**
UEERE0010	Design energy management controls for electrical installations in buildings*	80
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60
UEERE0028	Design hybrid renewable power systems*	80
UEERE0031	Design stand-alone renewable energy (RE) systems*	40
UEERE0033	Develop engineering solutions to renewable energy (RE) problems*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE62011 Advanced Diploma of Engineering Technology - Renewable Energy

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62120 Advanced Diploma of Engineering Technology - Electrical

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

An incorrect reference to the total general elective weighting point requirements was fixed.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate electrical equipment and systems and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

1460 core weighting points listed below; **plus**

700 general elective weighting points from the general elective units listed below.

Choose a total of 700 **weighting points** elective units from the list below, of which between 0 and 360 **weighting points** can be taken from Group A; between 0 and 160 **weighting points** can be taken from Group B; between 0 and 220 **weighting points** can be taken from Group C; between 0 and 220 **weighting points** can be taken from Group D; and between 200 and 700 **weighting points** can be taken from Group E (or all 700 elective **weighting points** can be taken from Group E.

Up to 360 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference

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Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60

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UEECD0043	Solve problems in direct current circuits*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0003	Arrange circuits, control and protection for electrical installations*	40
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	20
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	20
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	20
UEEEL0015	Manage large electrical projects*	40
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	60
UEEEL0019	Solve problems in direct current (d.c.) machines*	30
UEEEL0020	Solve problems in low voltage a.c. circuits*	80
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50
UEEEL0025	Test and connect transformers*	30
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and	20

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	sustainability issues in the energy sector	

Group A: Imported and common elective units		**Weighting Points**
BSBOPS203	Deliver a service to customers	20
BSBINS501	Implement information and knowledge management systems	50
BSBSTR501	Establish innovative work environments	50
BSBLDR522	Manage people performance	70
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60
ICTICT214	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: General elective units		**Weighting Points**
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0028	Plan an integrated cabling installation system*	40
UEECD0030	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software*	60
UEECD0031	Prepare engineering drawings using manual drafting and CAD for electrotechnology applications*	60
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40

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UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40

Group C: General elective units	**Weighting Points**

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UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEERE0011	Design grid-connected photovoltaic power supply systems*	60

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0016	Develop energy sector directory services*	80
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60

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UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0035	Design effective and efficient lighting for public, open and sports areas*	20
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEIC0005	Configure and maintain industrial control system networks*	60
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60
UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems*	60
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems*	60
UETTDRIS72	Diagnose and rectify faults in distributed generation systems*	60

Group E: General elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0015	Develop engineering solutions to photonic system	80

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	problems*	
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEEEL0041	Develop engineering solution for synchronous machine and control problems*	60
UEEEL0042	Develop engineering solutions for d.c. machine and control problems*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEIC0006	Design and configure Human-Machine Interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0008	Design electronic control systems*	60
UEEIC0032	Set up electronically controlled robotically operated complex systems*	80
UEERE0010	Design energy management controls for electrical installations in buildings*	80

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UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60
UEERE0028	Design hybrid renewable power systems*	80
UEERE0031	Design stand-alone renewable energy (RE) systems*	40
UEERE0033	Develop engineering solutions to renewable energy (RE) problems*	60
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems*	60
UETTDRIS74	Develop engineering solutions for energy supply system protection problems*	60

Qualification Mapping Information

This qualification replaces and is equivalent to UEE62111 Advanced Diploma of Engineering Technology - Electrical

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62220 Advanced Diploma of Electrical - Engineering

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate electrical equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

It develops competencies in the ethical and responsible application of mathematics, science, engineering techniques, standards and codes of practice, engineering design practices, supervision and management of physical, human and financial resources in engineering.

The core competencies of this qualification meet the prescribed requirements for Engineering Associate membership of Engineers Australia.

Participants seeking Engineers Australia membership should ensure that their training provider is accredited by that body to provide Engineering Education Programs at the level of Engineering Associate.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1320 weighting points** comprising:

840 core weighting points listed below; **plus**

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480 general elective weighting points from the general elective units listed below.

Choose a total of 480 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; between 0 and 100 **weighting points** can be taken from Group C; between 0 and 60 **weighting points** can be taken from Group D; and between 260 and 480 **weighting points** can be taken from Group E (or all 480 elective weighting points can be taken from Group E).

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60

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UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0015	Manage large electrical projects*	40
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBINS501	Implement information and knowledge management systems	50
BSBSTR501	Establish innovative work environments	50
BSBLDR522	Manage people performance	70
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEEDV0005	Install and maintain cabling for multiple access to	80

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	telecommunication services*	
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and	60

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	systems*	
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20

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UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*	40
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*	20
UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40

Group C: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60

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UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60

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UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system	80

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	operations*	
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises*	40
UEERE0011	Design grid-connected photovoltaic power supply systems*	60
UEERE0014	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: General elective units		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0016	Develop energy sector directory services*	80
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEIC0001	Analyse complex electronic circuits controlling fluids	80

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UEEIC0005	Configure and maintain industrial control system networks*	60
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus*	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems*	60
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems*	60
UETTDRIS72	Diagnose and rectify faults in distributed generation systems*	60

Group E: General elective units		**Weighting Points**
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEECS0012	Design embedded controller control systems	80
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEIC0006	Design and configure Human-Machine Interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0010	Develop and test code for microcontroller devices	60

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UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems*	60
UETTDRIS74	Develop engineering solutions for energy supply system protection problems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE62211 Advanced Diploma of Electrical - Engineering

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62320 Advanced Diploma of Electrical Engineering - Coal Mining

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate coal mining electrical equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

It develops competencies in the ethical and responsible application of mathematics, science, engineering techniques, standards and codes of practice, engineering design practices, supervision and management of physical, human and financial resources in engineering.

The core competencies of this qualification meet the prescribed requirements for Engineering Associate membership of Engineers Australia.

Participants seeking Engineers Australia membership should ensure that their training provider is accredited by that body to provide Engineering Education Programs at the level of Engineering Associate.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current 'Unrestricted Electricians Licence' or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1320 weighting points** comprising:

1000 core weighting points listed below; **plus**

320 general elective weighting points from the general elective units listed below.

Choose a total of 320 **weighting points** elective units from the list below, of which between 0 and 160 **weighting points** can be taken from Group A; between 0 and 60 **weighting points** can be taken from Group B; between 0 and 100 **weighting points** can be taken from Group C;

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between 0 and 60 **weighting points** can be taken from Group D; and between 160 and 320 **weighting points** can be taken from Group E (or all 320 elective **weighting points** can be taken from Group E).

Up to 160 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
RIIRAI609D	Establish and maintain electrical installations, reticulation and protection system	120
RIIRIS601D	Establish and maintain the risk management system	100
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60

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UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0015	Manage large electrical projects*	40
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBWOR502	Lead and manage team effectiveness	60

Group B: General elective units		**Weighting Points**
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0010	Supervise repair and overhaul of explosion-protected equipment type Group III ('t')*	60
UEEHA0011	Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)*	60

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UEEHA0012	Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)*	60
UEEHA0013	Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)*	60
UEEHA0014	Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)*	60
UEEHA0015	Supervise repair and overhaul of explosion-protected rotating machines*	60

Group C: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0001	Estimate electrotechnology projects	40
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40

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UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0005	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40

Group D: General elective units		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEIC0005	Configure and maintain industrial control system networks*	60

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UEEIC0006	Design and configure human-machine interface (HMI) networks	60
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60

Group E: General elective units		**Weighting Points**
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE62311 Advanced Diploma of Electrical Engineering - Coal Mining

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62420 Advanced Diploma of Engineering Technology - Air Conditioning and Refrigeration

Modification History

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate refrigeration and air conditioning equipment and systems and provide technical advice/sales.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

1360 core weighting points listed below; **plus**

800 general elective weighting points from the general elective units listed below.

Choose a total of 800 **weighting points** elective units from the list below, of which between 0 and 350 **weighting points** can be taken from Group A; and between 0 and 100 **weighting points** must be taken from Group B; and between 120 and 320 **weighting points** must be taken from Group C; and between 200 and 360 **weighting points** must be taken from Group D; and between 360 and 480 **weighting points** must be taken from Group E.

Up to 350 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified

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are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0023	Identify effects of energy on machinery and materials in an energy sector environment	120
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0041	Solve electrotechnical engineering problems	60
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0033	Use engineering applications software on personal computers	40
UEERA0001	Analyse the operation of HVAC air and hydronic systems*	80
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0003	Analyse the thermodynamic performance of HVAC/R systems	50

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UEERA0004	Analyse vibration and noise in refrigeration and air conditioning systems*	80
UEERA0034	Establish heat loads for commercial refrigeration and/or air conditioning applications*	80
UEERA0038	Establish the thermodynamic parameters of refrigeration and air conditioning systems*	80
UEERA0042	Evaluate thermodynamic and fluid parameters of refrigeration systems*	100
UEERA0058	Plan refrigeration and air conditioning projects	60
UEERA0061	Produce HVAC/R system design drawings*	80
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units.		**Weighting Points**
BSBCUS201	Deliver a service to customers	20
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
CPPBDN5013A	Develop and collaborate on building information models for small-scale building design projects	100
ICTICT203	Operate application software packages	20
UEECD0035	Provide basic instruction in the use of electrotechnology apparatus	20
UEECO0002	Maintain documentation	20
UEECO0015	Provide quotations for installation or service jobs	20
UEECO0017	Source and purchase material/parts for installation or service jobs	20

Group B: Qualification elective units.		**Weighting Points**
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10

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UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0081	Select refrigerant piping, accessories and associated controls*	40

Group C: Qualification elective units.		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEERA0060	Produce HVAC/R control system diagrams*	40
UEERA0080	Select basic commercial refrigeration system equipment, components and accessories*	40
UEERA0082	Select residential air conditioning system equipment, components and accessories*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units.		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECD0048	Undertake computations in an energy sector environment	120
UEERA0014	Design ammonia refrigerated systems*	40
UEERA0015	Design carbon dioxide refrigerated systems*	40
UEERA0016	Design commercial refrigeration systems and select components*	80
UEERA0021	Design control systems for refrigeration or heating, ventilation and air conditioning systems*	80
UEERA0022	Design heating, ventilation and air conditioning (HVAC) systems and select components*	60

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UEERA0023	Design hydrocarbon refrigerated systems*	40
UEERA0025	Design industrial refrigeration systems and select components*	80
UEERA0027	Design secondary refrigerant systems*	40
UEERA0039	Evaluate and report on building services energy management systems*	80
UEERA0040	Evaluate and report on the indoor air quality of buildings*	40
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60

Group E: Qualification elective units.		**Weighting Points**
UEECO0003	Manage contract variations	40
UEERA0017	Design complex air conditioning systems and select equipment*	120
UEERA0018	Design complex commercial refrigeration systems and select equipment*	40
UEERA0019	Design complex control systems for refrigeration or heating, ventilation, air conditioning systems*	80
UEERA0020	Design complex industrial refrigeration systems and select equipment*	40
UEERA0024	Design hydronic systems and select equipment*	80
UEERA0026	Design mechanical ventilation/exhaust systems and select equipment*	40
UEERA0029	Develop heat exchanger design specifications*	80
UEERA0030	Develop specifications and prepare drawings for HVAC/R projects*	60
UEERA0041	Evaluate new and alternative technologies applicable to electrotechnology applications	40

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Qualification Mapping Information

This qualification replaces and is equivalent to UEE62411 Advanced Diploma of Engineering Technology - Air-conditioning and Refrigeration

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE62520 Advanced Diploma of Air Conditioning and Refrigeration Engineering

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate refrigeration and air conditioning equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales. It includes regulatory requirements for purchasing and handling refrigerants.

It develops competencies in the ethical and responsible application of mathematics, science, engineering techniques, standards and codes of practice, engineering design practices, supervision and management of physical, human and financial resources in refrigeration and air conditioning engineering.

Competency development activities in this qualification are subject to regulations directly related to licencing. A relevant contract of training through an apprenticeship or relevant employment may be required to enable the application of the required knowledge and skills to on the job work activities and environments.

Refrigerant Handling Licence:

The achievement of the qualification meets the training components for the full national Refrigerant Handling Licence which is required to work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Refrigeration and Air Conditioning Occupational Licence:

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration/air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Electrical Occupation Licence:

The achievement of this qualification with the core restricted electrical units meet the electrical regulatory requirements for related restricted electrical work in most state/territories. This is required to work on electrical installations which are designed to operate at voltages greater than

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50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

A total of **2230 weighting points** comprising:

1980 core weighting points listed below; **plus**

250 general elective weighting points from the general elective units listed below.

Choose a total of 250 **weighting points** elective units from the list below, of which between 0 and 120 **weighting points** can be taken from Group A; and between 0 and 30 **weighting points** can be taken from Group B; and between 0 and 60 **weighting points** can be taken from Group C; and between 0 and 120 **weighting points** can be taken from Group D; and between 120 and 250 **weighting points** must be taken from Group E; or all electives units of 250 **weighting points** can be taken from Group E.

Up to 120 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work*	20

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UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0019	Fabricate, assemble and dismantle utilities industry components*	40
UEECD0020	Fix and secure electrotechnology equipment*	20
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0042	Solve problems in ELV single path circuits*	40
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications*	40
UEECS0033	Use engineering applications software on personal computers	40
UEERA0001	Analyse the operation of HVAC air and hydronic systems*	80
UEERA0002	Analyse the psychrometric performance of HVAC/R systems*	50
UEERA0004	Analyse vibration and noise in refrigeration and air conditioning systems*	80
UEERA0031	Diagnose and rectify faults in air conditioning and refrigeration control systems*	60
UEERA0034	Establish heat loads for commercial refrigeration and/or air conditioning applications*	80
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0038	Establish the thermodynamic parameters of refrigeration and air conditioning systems*	80
UEERA0042	Evaluate thermodynamic and fluid parameters of refrigeration systems*	100

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UEERA0044	Find and rectify faults in single phase motors and associated controls*	40
UEERA0045	Find and rectify faults in three phase motors and associated controls*	30
UEERA0050	Install refrigerant pipe work, flow controls and accessories*	60
UEERA0051	Install, commission, service and maintain air conditioning systems*	80
UEERA0052	Install, commission, service and maintain low temperature systems*	40
UEERA0053	Install, commission, service and maintain medium temperature systems*	60
UEERA0055	Manage refrigeration and air conditioning projects	40
UEERA0058	Plan refrigeration and air conditioning projects	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERA0061	Produce HVAC/R system design drawings*	80
UEERA0062	Recover and charge refrigerants*	40
UEERA0079	Safely handle refrigerants and lubricants*	40
UEERA0081	Select refrigerant piping, accessories and associated controls*	40
UEERA0092	Solve problems in low voltage refrigeration and air conditioning circuits*	40
UEERA0094	Verify functionality and compliance of refrigeration and air conditioning installations*	40
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply*	20
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.*	20

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UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring*	60
UEERL0005	Locate and rectify faults in low voltage (LV) electrical equipment using set procedures*	20

Group A: Imported and common elective units.		**Weighting Points**
BSBLDR522	Manage people performance	70
BSBINS501	Implement information and knowledge management systems	50
BSBSTR502	Facilitate continuous improvement	60
BSBSTR501	Establish innovative work environments	50
BSBTWK502	Manage team effectiveness	60
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID009	Provide cardiopulmonary resuscitation	10
MEM16006	Organise and communicate information*	20
MEM16008	Interact with computing technology*	20
MEM30031A	Operate computer-aided design (CAD) system to produce basic drawing elements	40
MEM30032A	Produce basic engineering drawings	80
MEM30033A	Use computer-aided design (CAD) to create and display 3-D models*	40

Group B: Qualification elective units.		**Weighting Points**
UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant	10
UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant	10
UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants	10

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UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment*	20
UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment*	20
UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems*	20
UEERA0054	Maintain microbial control of refrigeration and air conditioning systems	20
UEERA0065	Repair and service ammonia refrigeration systems*	20
UEERA0066	Repair and service carbon dioxide refrigeration systems*	20
UEERA0067	Repair and service secondary refrigeration systems*	20
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems*	20
UEERA0069	Resolve problems in beverage dispensers*	40
UEERA0070	Resolve problems in central plant air conditioning systems*	40
UEERA0071	Resolve problems in dairy refrigeration systems*	20
UEERA0072	Resolve problems in hydronic systems*	40
UEERA0073	Resolve problems in ice making systems*	20
UEERA0075	Resolve problems in post-mix refrigeration systems*	20
UEERA0076	Resolve problems in refrigerated beverage vending cabinets*	20
UEERA0077	Resolve problems in transport refrigeration systems*	20
UEERA0078	Resolve problems in ultra-low temperature refrigeration systems*	20
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems*	20
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*	40

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UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*	40

Group C: Qualification elective units.		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEERA0060	Produce HVAC/R control system diagrams*	40
UEERA0080	Select basic commercial refrigeration system equipment, components and accessories*	40
UEERA0082	Select residential air conditioning system equipment, components and accessories*	40
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: Qualification elective units.		**Weighting Points**
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEERA0014	Design ammonia refrigerated systems*	40
UEERA0015	Design carbon dioxide refrigerated systems*	40
UEERA0016	Design commercial refrigeration systems and select components*	80
UEERA0021	Design control systems for refrigeration or heating, ventilation and air conditioning systems*	80
UEERA0022	Design heating, ventilation and air conditioning (HVAC) systems and select components*	60
UEERA0023	Design hydrocarbon refrigerated systems*	40
UEERA0025	Design industrial refrigeration systems and select components*	80
UEERA0027	Design secondary refrigerant systems*	40

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UEERA0039	Evaluate and report on building services energy management systems*	80
UEERA0040	Evaluate and report on the indoor air quality of buildings*	40
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60

Group E: Qualification elective units.		**Weighting Points**
UEECO0003	Manage contract variations	40
UEERA0008	Audit HVAC/R control systems for compliance with regulations and standards*	60
UEERA0009	Audit energy use for commercial HVAC/R systems*	40
UEERA0017	Design complex air conditioning systems and select equipment*	120
UEERA0018	Design complex commercial refrigeration systems and select equipment*	40
UEERA0019	Design complex control systems for refrigeration or heating, ventilation, air conditioning systems*	80
UEERA0020	Design complex industrial refrigeration systems and select equipment*	40
UEERA0024	Design hydronic systems and select equipment*	80
UEERA0026	Design mechanical ventilation/exhaust systems and select equipment*	40
UEERA0029	Develop heat exchanger design specifications*	80
UEERA0030	Develop specifications and prepare drawings for HVAC/R projects*	60
UEERA0041	Evaluate new and alternative technologies applicable to electrotechnology applications	40

Qualification Mapping Information

This qualification replaces and is equivalent to UEE62511 Advanced Diploma of Air-conditioning and Refrigeration Engineering

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEE63020 Advanced Diploma of Electrical Systems Engineering

Modification History

Release 2: This minor update is the second release of this qualification in the UEE Electrotechnology Training Package.

Two units added to general electives.

Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification cover competencies to develop, design and validate/evaluate, select, commission, maintain and diagnose faults/malfunctions on advanced electrical equipment and systems. It also provides skills to manage risk, estimate and manage projects and provide technical advice/sales.

It develops competencies in the ethical and responsible application of mathematics, science, engineering techniques, standards and codes of practice, engineering design practices, supervision and management of physical, human and financial resources in engineering.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE33020 Certificate III in Electrical Fitting

or

- a current Electrical Fitter Occupational License or its equivalent issued in an applicable Australian state or territory.

Packaging Rules

A total of **1420 weighting points** comprising:

840 core weighting points listed below; **plus**

580 general elective weighting points from the general elective units listed below.

Choose a total of 580 **weighting points** elective units from the list below, of which between 0 and 220 **weighting points** can be taken from Group A; between 0 and 160 **weighting points** can be taken from Group B; between 0 and 160 **weighting points** can be taken from Group C;

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between 0 and 160 **weighting points** can be taken from Group D; and between 200 and 580 **weighting points** can be taken from Group E (or all 580 elective weighting points can be taken from Group E).

Up to 220 weighting points of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisites Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60

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UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0015	Manage large electrical projects*	40
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group A: Imported and common elective units		**Weighting Points**
BSBINS501	Implement information and knowledge management systems	50
BSBSTR501	Establish innovative work environments	50
BSBLDR522	Manage people performance	70
BSBSTR502	Facilitate continuous improvement	60
BSBTWK502	Manage team effectiveness	60

Group B: General elective units		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40

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UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0013	Install, set up and commission interval metering*	20
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	60
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60

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UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0003	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40

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UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UETTDRIS43	Perform low voltage field switching operation to a given schedule*	50
UETTDRIS44	Perform HV field switching operation to a given schedule*	40
UETTDRIS47	Sample, test, filter and reinstate insulating oil*	40
UETTDRIS67	Solve problems in energy supply network equipment*	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems*	40
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation*	40
UETTDRSB39	Perform power system substation switching operation to a given schedule*	50

Group C: General elective units		**Weighting Points**
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80

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UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60
UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEHA0001	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0002	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEHA0006	Maintain equipment associated with hazardous areas*	60
UEEHA0009	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60

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UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60
UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60

Group D: General elective units		**Weighting Points**
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEEEL0006	Develop detailed and complex drawings for electrical systems using CAD systems*	60
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0035	Design effective and efficient lighting for public, open and sports areas*	20
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60

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UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60
UEERE0029	Design micro-hydro systems rated to 6.4 kW*	60
UEERE0030	Design renewable energy (RE) heating systems*	120
UEERE0032	Design wind energy conversion systems (WECS) rated to 10 kW*	60
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus*	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems*	60
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems*	60
UETTDRIS72	Diagnose and rectify faults in distributed generation systems*	60

Group E: General elective units		**Weighting Points**
UEECD0001	Analyse materials for suitability in electrical equipment*	80
UEECD0002	Analyse static and dynamic parameters of electrical equipment	80
UEECD0012	Contribute to risk management in electrotechnology systems	20
UEECD0015	Develop engineering solutions to photonic system problems*	80
UEECD0037	Provide engineering solutions for uses of materials and thermodynamic effects	80
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40

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UEEEC0005	Assess electronic apparatus compliance	60
UEEEC0011	Design and develop electronics/computer systems projects	40
UEEEC0014	Design signal-conditioning sub-systems	80
UEEEC0045	Modify digital signal processing (DSP) based sub-systems	80
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEEEL0041	Develop engineering solution for synchronous machine and control problems*	60
UEEEL0042	Develop engineering solutions for d.c. machine and control problems*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEHA0007	Plan electrical installations for hazardous areas*	20
UEEHA0008	Design gas detection systems	20
UEEIC0006	Design and configure Human-Machine Interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0008	Design electronic control systems*	60
UEEIC0032	Set up electronically controlled robotically operated complex systems*	80
UEERE0010	Design energy management controls for electrical installations in buildings*	80
UEERE0012	Develop effective engineering strategies for energy reduction in buildings*	60
UEERE0028	Design hybrid renewable power systems*	80
UEERE0031	Design stand-alone renewable energy (RE) systems*	40

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UEERE0033	Develop engineering solutions to renewable energy (RE) problems*	60
UETTDRIS74	Develop engineering solutions for energy supply system protection problems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE63011 Advanced Diploma of Electrical Systems Engineering

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0001 Assemble electronic components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble electronic components.

It includes preparing and assembling electronic apparatus. It also includes qualify checking of assembled components.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble electronic components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS hazards are identified, risks are assessed and control measures are implemented for work preparation

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	1.3	Assembling of electronic components work instructions are obtained and applied
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for work are obtained in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Assemble electronic components	**2.1**	WHS/OHS risk control measures and workplace procedures are followed
	2.2	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Components are placed and interconnections made in accordance with drawings or diagrams, industry standards and workplace procedures
	2.4	Work is completed in accordance within timeframe, environment and work instructions
3 Check quality of assembled components	**3.1**	WHS/OHS risk control measures and workplace procedures for work inspection and testing are followed
	3.2	Quality of assembled component is inspected and checked in accordance with work instruction and relevant industry standards
	3.3	Problem-solving techniques are used where faulty component/s are identified and corrective actions completed in accordance with workplace procedures
	3.4	Reporting is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling electronic components must include at least two different electronic apparatus consisting of the following:	• printed circuit board • plated through hole component or sub-system • surface-mount component or sub-system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA101A Assemble electronic components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0001 Assemble electronic components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/ occupational health and safety (OHS) requirements, including:
  - job safety assessments or risk mitigation processes
  - safe work method statements (SWMS)
- coordinating work with others
- checking and isolating circuits
- assembling electronic components/apparatus, including:
  - identifying and selecting tools, equipment and testing devices
  - identifying and applying work instructions, relevant workplace procedures, industry standards, codes of practice and regulations for electronic component assembly
  - selecting and placing components in accordance with drawings or diagrams
  - making connection without damaging components
  - adhering to quality workplace procedures and instructions
- verifying quality of assembled apparatus and connection of components
- applying problem solving techniques in accordance with workplace procedures
- completing required reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- identification of surface mount components
- requirements of standard with respect to surface mount, including soldering
- post solder inspection
- ball grid arrays
- identification of surface mount components including ball grid arrays

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- requirement of standards with respect to soldering
- post-solder inspection
- electronic components, apparatus and circuits
- interconnections requirements
- relevant industry standards
- reporting requirements
- relevant job safety assessments or risk mitigation processes
- relevant testing devices and inspection requirements
- relevant WHS/OHS legislated requirements
- requisition procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0002 Conduct quality and functional tests on assembled electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct quality and functional tests on assembled electronic apparatus.

It includes working safely with electricity, testing device set-up, following inspection and testing procedures, interpreting and reporting testing and inspection results, and making recommendations for dealing with defects.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct inspection and testing	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control measures for work preparation are followed
	1.3	Scope of apparatus functions and quality requirements are identified, obtained and applied
	1.4	Testing processes and workplace procedures are reviewed and testing equipment checked for correct operation and safety
	1.5	Apparatus inspection and testing is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed
2 Conduct apparatus testing	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Need to inspect, test or measure live work is determined in accordance with WHS/OHS and workplace procedures
	2.3	Apparatus is checked and isolated in accordance with WHS/OHS and workplace procedures
	2.4	Inspection and testing are conducted in accordance with relevant industry standards, principles and technology of electrical measurement
	2.5	Test results are interpreted within the scope of required functionality and quality
3 Conduct apparatus inspection	**3.1**	WHS/OHS risk control work measures and procedures are followed
	3.2	Apparatus is checked and isolated in accordance with WHS/OHS and workplace procedures
	3.3	Apparatus is inspected for quality in accordance with workplace procedures and relevant industry standards
	3.4	Work is completed in acceptable timeframe, environment and workplace conditions
4 Report on apparatus inspection and testing	**4.1**	Recommendations for repairs to defects are reported within the scope of workplace procedures
	4.2	Report forms/data sheets on inspection and testing are completed

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA105A Conduct quality and functional tests on assembled electronic apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0002 Conduct quality and functional tests on assembled electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- checking and isolating apparatus
- conducting apparatus inspection and testing
- following job specifications/scope
- identifying visual defects
- interpreting test results
- preparing to conduct inspection and testing
- recommending appropriate actions for dealing with defect apparatus
- reporting on apparatus inspection and testing
- reporting test results
- selecting and using testing and measuring devices correctly
- testing and measuring live work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- relevant verification procedures
- test equipment
- testing, including:

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  - checklists
  - interpreting test results within given parameters
  - requirements
  - routine testing procedures
- quality inspection, including:
  - checklists
  - interpreting test results within given parameters
  - requirements
  - routine testing procedures
- non-compliance reporting.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to conducting functional and quality tests on assembled electronic apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0003 Modify electronic sub-assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to modify electronic sub-assemblies.

It includes working safely, checking components against job specifications, testing and following quality procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEAS0001 Assemble electronic components

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to modify electronic sub-assemblies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures for work preparation are followed

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	1.3	Scope of rework is determined from documentation or from work supervisor
	1.4	Re-work of sub-assemblies is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed
	1.5	Sources of materials required for work are in accordance with workplace procedures
	1.6	Tools and equipment required for re-work are selected for their effectiveness and checked for correct operation and safety
2 Modify sub-assemblies	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Components are disconnected and reconnected in accordance with relevant industry and technology of connection methods used
	2.5	Work is carried out in accordance with quality procedures and workplace/industry standards
	2.6	Re-work of sub-assemblies is completed in accordance with timeframes and environment and workplace conditions
3 Check quality of modified sub-assemblies	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Quality of re-work is checked in accordance with workplace/industry standards
	3.3	Functional tests on re-worked sub-assemblies are carried out in accordance with workplace procedures
	3.4	Actions are taken to rectify defects within the scope of workplace procedures
	3.5	Report forms/data sheets on re-work of sub-assemblies are completed in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA104A Modify electronic sub assemblies.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0003 Modify electronic sub-assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adhering to quality procedures
- applying relevant work health and safety/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out functional tests
- checking and isolating circuits
- checking quality of modified sub-assemblies
- completing re-work in acceptable timeframe, environment and workplace conditions
- completing workplace reports/data sheets
- disconnecting and reconnecting components
- determining materials for work
- following job specifications
- inspecting, testing and measuring live work
- modifying sub-assemblies
- preparing to modify sub-assemblies
- rectifying defects
- selecting tools and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- quality management system
- relevant manufacturer specifications and operating instructions
- relevant materials, tools and equipment
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to re-working electronic sub-assemblies
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0004 Select electronic components for assembly

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select electronic components for assembly from job specifications.

It includes preparing, selecting electronic components for assembly, and completing workplace report.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare electronic components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Work instructions are obtained and applied

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	1.3	Advice is sought from supervisor to ensure work is coordinated effectively with others
	1.4	Materials required for work are obtained in accordance with workplace procedures
	1.5	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Select electronic components	**2.1**	WHS/OHS risk control measures and workplace procedures are followed
	2.2	Electronic components are selected, sorted and placed in accordance with work instructions
	2.3	Problem-solving techniques are used to resolve issues with supply of component in accordance with workplace procedures
	2.4	Quality checks of components are in accordance with work instructions and relevant industry standards
	2.5	Work is completed in acceptable timeframe given environment and workplace conditions
3 Complete work report	**3.1**	WHS/OHS risk control measures and workplace procedures for work completion are followed
	3.2	Workplace report/s on component/s are completed in accordance with work instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting components for assembly must include at least two different electronic	• a chassis • printed circuit board

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apparatus. These apparatuses must consist of the following basic features:

- adjustment components and interconnections

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA102A Select electronic components for assembly.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0004 Select electronic components for assembly

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety / occupational health and safety (WHS/OHS) requirements, including using risk control measures
- completing workplace report
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- preparing and selecting electronic components, including:
  - following job specifications
  - identifying and selecting components
  - handling components without damaging
  - adhering to relevant quality procedures
- using problem-solving techniques in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- types of components, including resistors, inductors, capacitors, diodes, transistor, integrated circuits, printed circuit boards, sub-assemblies, and mounting/enclosing, connection and termination hardware
- the physical features and primary characteristic of components, including:
  - features, including shape, size and connections
  - characteristics, including parameter and power ratings and polarity
  - methods of identifying and marking of component ratings
  - identifying and handling static sensitive components
  - selection of components
- through-hole component

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- surface-mount component
- component handling techniques
- problem-solving techniques
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications, including relevant testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions, including quality inspection and checking workplace procedures
- types of electronic components, including resistors, inductors, capacitors, diodes, transistor, integrated circuits, printed circuit boards, sub-assemblies, and mounting/enclosing, connection and termination hardware.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0005 Set up and check electronic component assembly machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and check electronic component assembly machines.

It includes working safely, interpreting job specifications, identifying components by characteristics, following machine set-up work instructions and following quality procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEAS0001 Assemble electronic components

UEEAS0004 Select electronic components for assembly

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set-up machine	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control measures for work preparation are followed
	1.3	Work instructions are obtained and applied
	1.4	Advice is sought from the work supervisor to ensure that work is coordinated effectively with others
	1.5	Materials required for the work are obtained in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Set up machine	**2.1**	WHS/OHS risk control work measures are followed
	2.2	Machines are checked and isolated in accordance with WHS/OHS and workplace procedures
	2.3	Electronic components are selected sorted and placed in accordance with work instructions and workplace procedures
	2.4	Machine is set up in accordance with work instructions ensuring specified components are loaded correctly
	2.5	Solutions are used to resolve issues with supply of component
	2.6	Quality and inspection checks are conducted to ensure components comply with workplace procedures/relevant industry standards
	2.7	Work is completed in acceptable timeframe given environment and workplace conditions
3 Complete work report	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Operational checks of machine are carried out in accordance with workplace procedures to ensure quality outcome are met
	3.3	Work report forms/data sheets on components are completed in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA103A Set up and check electronic component assembly machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0005 Set up and check electronic component assembly machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adhering to quality check procedures
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- checking and isolating machines
- completing work reports
- conducting machine operation checks
- following assembly job specifications
- identifying components
- obtaining materials for work
- obtaining work instructions
- preparing to set up machine
- setting up machine.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant industry standards
- relevant inspection methods
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instruction, quality, policies and procedures
- object-oriented programming language elements, including:
  - classes

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- objects
- instantiation
- fields
- methods
- constructors
- inheritance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up and checking electronic component placement machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0006 Use lead-free soldering techniques

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use lead-free soldering techniques.

It includes working safely, performing high reliability soldering/de-soldering, checking components against job specifications, testing and following quality procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to carry out lead-free soldering	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures for work preparation are followed

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	1.3	Scope of work is determined from documentation or from work supervisor
	1.4	Work is coordinated with others involved to ensure work schedules are met and safety measures are followed
	1.5	Materials required for work are sourced and checked for lead-free soldering requirements in accordance with workplace procedures and relevant industry standards
	1.6	Tools and equipment required for work are selected for their effectiveness and checked for correct operation and safety
2 Carry out lead-free soldering	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Lead-free soldering characteristic and requirements are applied to soldering/de-soldering operations
	2.3	Components are connected and disconnected in accordance with workplace procedures and relevant industry standards
	2.4	Work is carried out in accordance with quality workplace procedures and relevant industry standards
	2.5	Lead-free soldering is completed in acceptable timeframe, environment and workplace conditions
3 Check quality of lead-free soldering work	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Quality of lead-free is checked in accordance with workplace procedures and industry standards
	3.3	Functional tests on lead-free soldered connections are carried out in accordance with workplace routines
	3.4	Actions are taken to rectify defects within the scope of work and in accordance with workplace procedures
	3.5	Report forms/data sheets on lead-free soldering work are completed

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA106A Use lead-free soldering techniques.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0006 Use lead-free soldering techniques

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- adhering to quality procedures
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out functional tests on lead-free soldered connections
- carrying out lead-free soldering
- checking quality of lead-free soldering work
- following manufacturer specifications and operating instructions
- preparing to carryout lead-free soldering
- rectifying defects
- soldering and de-soldering components
- sourcing and checking materials
- using high reliability lead-free soldering/de-soldering techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- completed soldered connections compliance requirements
- component requirements for lead-free soldering
- equipment requirements
- lead-free solder issues
- lead-free soldering cleaning requirements
- lead-free soldering safety considerations
- quality management procedures for soldering and re-work
- relevant differences, advantages and disadvantages between lead and lead-free solder
- relevant industry standards
- relevant manufacturer specifications and operating instructions

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- relevant soldering tools and equipment
- relevant types of fluxes and their activity level
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures
- solder types and characteristics
- soldering techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to applying lead-free soldering technology
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0007 Assemble, mount and connect control gear and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble, mount and connect control gear and switchgear, including the interconnections within a switchboard enclosure intended to operate at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes working safely; following standards, specifications and component manufacturer requirements; matching equipment with that specified; terminating cables; connecting wiring and completing necessary documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

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UEECD0046 Solve problems in single path circuits

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to assemble, mount and connect control gear and switchgear	**1.1** Switchgear and control gear assembly installation is determined and planned in accordance with job specifications, wiring and schematic diagrams
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.3 Work instructions, including layout and wiring diagrams, are applied in accordance with workplace procedures
	1.4 Advice is sought from supervisor to ensure work is coordinated effectively with relevant person/s
	1.5 Materials required for the control gear and switchgear installation work are obtained in accordance with workplace procedures
	1.6 Tools, equipment and measuring devices required to carry out work are obtained and checked for correct operation and safety
2 Assemble, mount and connect control gear and switchgear	**2.1** Switchgear and control gear assembly hazards are identified, risks assessed and control measures are implemented in accordance with workplace procedures
	2.2 Circuits are checked and isolated in accordance with WHS/OHS workplace requirements and procedures

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	2.3 Component layout is in accordance with job specifications, wiring and schematic diagrams
	2.4 Switchgear/control gear is fitted in accordance with work instructions, industry standards, manufacturer specifications and workplace procedures
	2.5 Interconnections are made in accordance with work instructions, industry standards and workplace procedures
	2.6 Regular quality checks are carried out in accordance with workplace procedures
	2.7 Completed switchboard function is tested in accordance with workplace procedures, industry standards and manufacturer specifications
	2.8 Labelling and numbering cable are undertaken in accordance with industry standards, wiring and schematic diagrams
	2.9 Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	2.10 Assembly work is carried out without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices
3 Finalise and inspect assembled control gear and switchgear installation	**3.1** Assembled switchboard panel is visually inspected and checked against work instructions, industry standards and manufacturer specifications in accordance with workplace procedures
	3.2 Problem-solving techniques are used where corrective actions to assembled components are required in accordance with regulatory requirements and industry standards
	3.3 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling at least two different control panels must include:	• general supply main switches • multiple supplies • safety services

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA110A Assemble, mount and connect control gear and switchgear.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0007 Assemble, mount and connect control gear and switchgear

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying labelling and numbering to cables and using terminal numbering in accordance with relevant industry standards and workplace procedures
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - hazards associated with switchgear and control gear assembly and installation
  - using risk control measures
- applying sustainable energy principles and practices
- assembling, mounting and connecting control gear and switchgear, including:
  - checking circuits are isolated
  - making connection without damaging switchgear/control
  - making interconnections
  - mounting and wiring switchgear and control gear
  - selecting and placing switchgear and control gear in accordance with industry standards, wiring and schematic diagrams
- checking tools, equipment and testing devices for correct operation and safety
- completing workplace documentation
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- inspecting and checking installation of assembled control gear and switchgear
- using problem-solving techniques when determining the nature of a fault in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- assembly instructions, including industry standards, wiring and schematic diagrams

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- cable labelling and numbering, including:
  - cable labelling/identification
  - component labelling/identification
  - use of terminal strips to assist fault finding
- choice of switchgear and control gear, including:
  - current ratings
  - overload and fuse settings
  - voltage ratings
- other considerations, including:
  - earthing
  - size of power and control circuit conductors
  - equipment layout methods and accessories
- component layout, including:
  - interconnecting plugs and sockets
  - placement/layout of control circuit devices and components
  - placement/layout of power circuit devices and components
  - segregation of cables at different voltages
  - wiring and schematic diagrams
- equipment layout, methods and accessories
- problem-solving techniques including quality checks
- relevant electrical and WHS/OHS regulations and legislation requirements
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures
- risk mitigation processes include safety issues associated with switchgear and control gear assembly and installation
- sustainable energy principles and practices
- switchgear and control gear mounting and wiring techniques, including switchboard testing
- techniques to check if circuits are isolated
- tools, equipment and measuring devices
- types of switchgear and other equipment, including:
  - air-break
  - bus bars and cleats
  - bus ties
  - circuit breakers
  - contactors
  - fuses
  - interlock devices
  - load break switches
  - motor starters

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- oil type
- relays
- switch fuses
- transformers
- variable speed drives (VSDs).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment (including control panels) and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0008 Fabricate and assemble bus bars

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fabricate and assemble copper (Cu) and aluminium (Al) electrical bus bars for interconnections in switchboards and specific plant, and that have high current demand.

It includes working safely to industry standards and specifications in making up and fixing electrical bus bars and completing necessary documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to make up and assemble bus bars	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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		for a given work area are identified and applied
	1.2	Hazards are identified, risks assessed and control measures implemented
	1.3	Work instructions, including layout and wiring diagrams, are obtained and applied
	1.4	Advice is sought from supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for the work are obtained in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Make up and assemble bus bars	**2.1**	WHS/OHS risk control work measures are followed
	2.2	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Bus bars are formed/made up in accordance with work instructions, industry standards, manufacturer specifications and workplace procedures
	2.4	Bus bars are connected in accordance with work instructions, industry standards, manufacturer specifications and workplace procedures
	2.5	Quality checks are carried out in accordance with workplace procedures
	2.6	Completed bus bar assembly is inspected and tested in accordance with workplace procedures, industry standards and manufacturer specifications
	2.7	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	2.8	Work is carried out without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Check quality of assembled bus bars	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Assembled bus bars are checked against work

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instructions, industry standards and manufacturer specifications in accordance workplace procedures

3.3 Problem-solving techniques are used where corrective actions to assembled components are required in accordance with regulatory requirements and industry standards

3.4 Work report forms are completed accurately and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fabricating and assembling bus bars must include at least the following:

- two different bus bar assemblies, one of which must be custom made

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA112A Fabricate and assemble bus bars.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0008 Fabricate and assemble bus bars

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques when determining the nature of a fault
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
  - checking tools, equipment and testing devices for correct operation and safety
- applying sustainable energy principles and practices
- checking quality and installation of assembled bus bars
- communicating effectively with relevant stakeholders
- completing workplace documentation
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- following work instructions
- interpreting electrical layout and wiring diagrams
- inspecting and testing installed bus bars
- making up and assembling electrical bus bars, including:
  - following assembly instructions
  - forming and making up correctly
  - terminating bus bars correctly
  - adhering to quality procedures
  - checking circuits are isolated
  - making interconnections
  - considering designs
  - connecting bus bars correctly
- performing regular quality checks.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- chemical and metallurgical properties of bus bars, including:
  - copper (Cu)
  - aluminium (Al)
  - copper clad aluminium
  - hard drawn copper
  - annealing
  - types of high conductivity copper
- current-carrying capacity, including:
  - standard cross-sections of bar
  - current ratings
  - temperature rise
- design considerations, including:
  - electrical and thermal resistance
  - mechanical strength in tension, compression and shear
  - resistance to fatigue failure
  - electrical resistance of surface films
  - ease of fabrication
  - resistance to corrosion
  - first cost and high eventual recovery value
  - choice of bus bar materials
  - creep properties
  - fatigue properties
  - self-extinguishing arcs in Cu and Al
  - insulated bus bar
  - provision for bus bar expansion
- effects of short circuit, including:
  - temperature rise
  - electromagnetic stresses
  - cleats and structural supports
- electrical bus bar types, including:
  - main bus bars
  - intermediate bus bars
  - cell bus bars
  - droppers
  - flexible joints

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  - hanger bars
  - short circuit frames
- jointing types and techniques, including:
  - clamped joints
  - bolted
  - riveted
  - welded
  - soldered or brazed
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- shaping and bending equipment and techniques, including:
  - hand and power tools
  - hydraulic shears
  - hydraulic punches
  - hydraulic notcher
  - machines allowing multiple operations
- stand-off insulators, including:
  - form
  - function
  - physical and electrical properties/characteristics
  - selection.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEAS0009 Mount and wire control panel equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to mount and wire control panel equipment.

It includes working safely, following layout and circuit diagrams, selecting and mounting equipment, installing and terminating wiring, functional testing and completing necessary documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Assembly

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to mount and wire control panel equipment	**1.1** Wire control panel equipment installation is determined and planned in accordance with job specifications, wiring and schematic diagrams
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.3 Work instructions, including layout and wiring diagrams, are applied in accordance with workplace procedures
	1.4 Advice is sought from supervisor to ensure work is coordinated effectively with others
	1.5 Materials required for the control panel work are obtained in accordance with workplace procedures
	1.6 Tools, equipment and measuring devices required to carry out control panel work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Mount and wire control panel equipment	**2.1** Control panel equipment and electrical hazards are identified, risks assessed and control measures implemented
	2.2 Circuits are checked and isolated in accordance with WHS/OHS workplace requirements and procedures
	2.3 Components are laid out in accordance with job specifications, wiring and schematic diagrams

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	2.4	Control panel components including switch gear, interconnecting plugs and sockets and earthing are fitted in accordance with work instructions, industry standards, manufacturer specifications and workplace procedures
	2.5	Control panel wiring is installed in accordance with wiring and schematic diagrams, work instructions, industry standards, manufacturer specifications and workplace procedures
	2.6	Regular quality checks are carried out in accordance with workplace procedures
	2.7	Completed control panel is visually inspected and tested in accordance with workplace procedures, industry standards and manufacturer specifications
	2.8	Labelling and cable numbering are undertaken in accordance with industry standards, wiring and schematic diagrams
	2.9	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	2.10	Work is carried out without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices
3 Finalise and inspect control panel installation	**3.1**	Assembled control panel is tested against work instructions, industry standards and manufacturer specifications in accordance with workplace procedures
	3.2	Problem-solving techniques are used, where corrective actions to assembled components are required, in accordance with regulatory requirements and industry standards
	3.3	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling must include at least two different control panels including the following:	• controls for more than two electrical machines, electro-mechanical and/or electronic control and devices such as relays, timers, logic controllers, indicators and switches/push buttons

Unit Mapping Information

This unit replaces and is equivalent to UEENEEA113A Mount and wire control panel equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEAS0009 Mount and wire control panel equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying labelling and numbering to cables and using terminal numbering in accordance with relevant industry standards and workplace procedures
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- following layout and wiring diagrams
- inspecting and checking installation of control panel equipment
- laying out components, including:
  - selecting and placing switchgear and control gear in accordance with industry standards, wiring and schematic diagrams, including low voltage (LV) and extra-low voltage (ELV) devices
  - segregating of cables at different voltages in accordance with relevant industry standards
  - interconnecting plugs and sockets
- mounting and wiring control panel equipment in accordance with relevant industry standards
- selecting switchgear and control gear to required specifications, including voltage ratings, current ratings and overload settings
- using problem-solving techniques when determining the nature of a fault.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- control panel types and mounting techniques, including:
  - clearances
  - DIN mounted switchgear

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    - direct mounting on insulated panels
    - metallic and non-metallic (insulated)
    - rear connections
    - strapped harness wiring and use of duct to support and channel wiring
- cable labelling and numbering, including:
    - cable and component labelling/identification
    - use of terminal strips to assist fault finding
- component layout, including:
    - interconnecting plugs and sockets
    - placement/layout of power and control circuit devices and components
    - segregation of cables at different voltages
    - wiring and schematic diagrams
- choice of switchgear and control gear, including:
    - current ratings
    - number of operations
    - overload and fuse settings
    - voltage ratings
- other considerations, including:
    - earthing of panels
    - effect of high current devices on electromagnetic components or programmable logic controllers (PLC)
    - effects of electronic components on other devices
    - size of power and control circuit conductors
- relevant industry standards
- problem solving techniques including quality checks
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- risk mitigation processes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0001 Analyse materials for suitability in electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse materials for suitability in electrical equipment.

It includes preparing and analysing materials. It also includes documenting and reporting analysis.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0002 Analyse static and dynamic parameters of electrical equipment

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse materials	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed

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	1.3	Machine analysis is determined from performance specifications and/or reports and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines in consultation with others involved
	1.5	Strategies are identified, developed and implemented
2 Apply and analyse materials	**2.1**	WHS/OHS risk control work measures and workplace procedures for carrying out the work are followed
	2.2	Materials are applied to developing machine parts
	2.3	Characteristics, specifications and performance requirements of the materials are obtained in accordance with workplace procedures
	2.4	Analysis of materials is carried out in accordance with workplace procedures
	2.5	Unplanned events are responded to in accordance with WHS/OHS requirements and workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards
3 Document and report the results of analysis	**3.1**	Solutions to materials analysis are tested and modified as required
	3.2	Analysis is reported to appropriate person/s to establish action to be taken based on findings
	3.3	Justification and instruction for actions are documented in work records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Analysis must include the following:

- at least two different types of materials

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE163A Analyse materials for suitability in electrical equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0001 Analyse materials for suitability in electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining material properties
- documenting and reporting results of the material analysis
- documenting instruction for implementing any actions resulting from the analysis
- documenting justification of actions to be implemented
- forming strategies for analysing machine performance
- obtaining machine characteristics, specifications and performance requirements appropriate to each situation
- preparing to analyse materials
- testing results of the analysis.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant analysis methods
- relevant implementation strategies
- relevant industry standards
- relevant machine characteristics, specifications and performance requirements
- relevant manufacturer specifications and operating instructions
- relevant materials
- relevant job safety assessments or risk mitigation processes

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to analysing materials for suitability in equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0002 Analyse static and dynamic parameters of electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse static and dynamic parameters of electrical equipment.

It includes preparing and analysing static and dynamic parameters. It also includes documenting and reporting the analysis.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse static and dynamic parameters	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed

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	1.3	Machine analysis is determined from performance specifications and/or reports and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines in consultation with others involved
	1.5	Strategies are identified, developed and implemented
2 Analyse parameters	**2.1**	WHS/OHS risk control work measures and workplace procedures for carrying out the work are followed
	2.2	Statics and dynamics are applied to developing analytical solutions to machine parameters
	2.3	Parameters, specifications and performance requirements of the machine/s are obtained in accordance with workplace procedures
	2.4	Machine parameters are analysed in accordance with workplace procedures
	2.5	Unplanned events are responded to in accordance with WHS/OHS requirements and workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards
3 Document and report results of the analysis	**3.1**	Solutions to machine analysis are tested and modified as required in accordance with WHS/OHS requirements and workplace procedures
	3.2	Analysis of findings, calculations and assumptions are documented in accordance with workplace procedures
	3.3	Analysis is reported to relevant person/s for action
	3.4	Justification and instruction for actions are documented in work and/or development records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package. Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE161A Analyse static and dynamic parameters of electrical equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0002 Analyse static and dynamic parameters of electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- analysing machine parameters
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- documenting and reporting results of the analysis of static and dynamic parameters of machines
- documenting instructions for implementing any actions resulting from the analysis
- forming effective strategies for analysing machine performance
- obtaining machine parameters, specifications and performance requirements
- preparing to analyse static and dynamic parameters of machinery
- testing the results of the analysis.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- function of mechanical parts and components
- problem-solving techniques
- relevant analysis testing methods
- relevant development and implementation strategies
- relevant industry standards
- relevant machine parameters, specifications and performance requirements
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to analysing static and dynamic parameters of equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0003 Apply industry and community standards to engineering activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply industry and community standards to engineering activities.

It includes applying knowledge and application of ethical and community standards, seeking advice and adopting appropriates technologies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Review ethical and community standards	**1.1** Ethical standards are reviewed and applied in accordance with relevant industry standards
	1.2 Advice on the application processes for applying ethical community and relevant industry standards is obtained from relevant person/s

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	1.3	Contributions to periodic revision of relevant industry standards is conducted through formal discussions with relevant person/s and submissions documented for public review in accordance with relevant community standards
2 Apply ethical and community standards	**2.1**	Ethical standards are applied to all formal interactions and activities
	2.2	Work is planned and managed in accordance with relevant community and industry standards
	2.3	Quality of work is monitored in accordance with relevant community and industry standards
	2.4	Advice on engineering issues and adoption of technologies is sought from relevant person/s in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE080A Apply industry and community standards to engineering activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0003 Apply industry and community standards to engineering activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying ethical standards to all professional interactions and activities
- contributing to periodic review of relevant industry standards
- monitoring work outcomes and ensuring compliance with relevant standards, community and relevant industry standards
- obtaining advice on applying relevant industry standards
- planning and managing work
- reviewing and applying ethical standards
- seeking advice on engineering issues and adopting technologies from relevant person/s in accordance with relevant industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant ethical standards, including:
  - application of ethical standards
  - common tenets of ethical standards
  - ethical standards of professional bodies in the engineering industry
  - purpose of ethical standards
  - purpose of standards and how they are applied
  - standards development organisations and compliance systems
  - standards development process and community involvement
- relevant industry community standards
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace quality policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to industry and community standards expected of engineers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0004 Apply material science to solving electrotechnology engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply material science to solving electrotechnology engineering problems.

It includes identifying and solving electrotechnology engineering problems using material science. It also includes applying knowledge of materials science and documenting justification for solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify electrotechnology problem/s	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and

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		workplace procedures are followed
	1.3	Scope of electrotechnology problem and material for the environment are obtained and applied from documentation and/or work supervisor
	1.4	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Apply material science to developing solutions	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Tests and measurements are undertaken in accordance with WHS/OHS requirements and workplace procedures
	2.3	Tests, measurements and results are used to identify material science solutions to electrotechnology problems
	2.4	Effects on environments, materials and health risks are considered in resolving electrotechnology problems
	2.5	Unplanned situations are dealt with in accordance with WHS/OHS and approval of relevant person/s
3 Report solution/s	**3.1**	Proposed solutions to electrotechnology problems are documented with justification for the solutions
	3.2	Identified health risks exposed by a material and/or application is documented in workplace report
	3.3	Proposed solution report is forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Applying material science from the workplace	• electrotechnology problems

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must include:

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE081A Apply material science to solving electrotechnology engineering problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0004 Apply material science to solving electrotechnology engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying material science to developing solutions to electrotechnology problems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- considering environment and health risks in resolving electrotechnology problems
- dealing with unplanned situations in accordance with WHS/OHS and approval from relevant person/s
- documenting proposed solutions and justification
- obtaining the scope of electrotechnology problem and materials to be used
- obtaining tools, equipment and testing devices
- interpreting results to identify material science solutions to electrotechnology problems
- using testing devices
- using test and measurement results to identify material science solutions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques
- relevant classification, nature and physical properties of materials used in electrotechnology
- relevant environment and health issues
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant material processing and manufacturing
- relevant material science
- relevant tests and measurement
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation, including
  - solution report
- relevant workplace instruction, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to material science in electrotechnology
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0005 Apply physics to solving electrotechnology engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply physics to solving electrotechnology engineering problems.

It includes identifying and solving physics-related problems and documenting justifications. It also includes applying knowledge of measurement techniques.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify electrotechnology-related problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed

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	1.3	Scope of electrotechnology problem is identified from documentation and/or work supervisor
	1.4	Problems are stated in writing and/or diagrammatic form to ensure appropriate methods are used to resolve them
	1.5	Equipment and testing devices required for problem solving are obtained and checked for correct operation and safety
2 Apply physics to developing solutions	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Tests and measurements are undertaken in accordance with WHS/OHS requirements and workplace procedures
	2.3	Tests, measurements and results are used to develop resolutions in static and dynamic problems
	2.4	Theoretical and measured values are applied to develop solutions to static and dynamics problems
	2.5	Results are applied to develop solutions to problems
	2.6	Unplanned situations are dealt with in accordance with WHS/OHS requirements and approval of relevant person/s
3 Report solution	**3.1**	Proposed solutions to electrotechnology problems are documented with justification for the solutions
	3.2	Adverse effects and outcomes of developed solution are reported
	3.3	Solution report is forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE082A Apply physics to solving electrotechnology engineering problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0005 Apply physics to solving electrotechnology engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying measured values to developing solutions to static and dynamic problems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- applying the laws of physics to developing solutions to electrotechnology problems
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- developing resolutions in static and dynamics problems
- identifying the scope of electrotechnology problems
- obtaining and using equipment and testing devices for problem solving
- reporting adverse effects in the developed solutions
- reporting developed solutions and justification.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques
- relevant adverse effects and outcomes of solution
- relevant equipment and testing devices
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant measurement values
- relevant physics theorems
- relevant job safety assessments or risk mitigation processes
- relevant tests and measurements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:

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- diagrammatic form
- solution report

- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to physics and how they apply to solving electrotechnology-related problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0006 Apply technologies and concepts to energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply technologies and concepts to energy sector work activities.

It includes preparing and applying technologies and concepts to work activities. It also includes checking results using technologies and applications of concepts using a range of information technologies, and applying analytical concepts to achieve desired outcomes ensuring work is completed in an agreed time, to industry standard and with a minimum of waste.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to apply technologies and concepts	**1.1** Instructions to apply technologies and concepts are communicated and confirmed

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	1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.3	Tools, equipment and personal protective equipment (PPE) necessary for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.4	Relevant person/s is consulted to ensure work is coordinated with others
	1.5	Resources and materials needed to apply technologies and concepts are confirmed, scheduled and obtained in accordance with workplace procedures
	1.6	Schedule to apply technologies and concepts, including practices for working safely, is confirmed in accordance with instructions and requirements
2 Use technologies and apply concepts to work	**2.1**	WHS/OHS workplace procedures and safe work practices are followed to eliminate or minimise incidents
	2.2	Schedule of using technologies and applying concepts to achieving the desired outcome is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste
	2.3	Further instructions are sought from relevant person/s in the event of unplanned events
	2.4	Ongoing checks of work quality are undertaken in accordance with workplace procedures and job requirements
3 Check results	**3.1**	Final checks are made to ensure technologies and applications of concepts conforms with instructions and requirements
	3.2	Relevant person/s is notified of completion in the use of technologies and applications of concepts
	3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned and made safe by applying sustainable energy practices

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3.5 Records are updated in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE144A Apply technologies and concepts to energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0006 Apply technologies and concepts to energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding work instruction
- obtaining and checking tools and equipment
- following work schedules
- using technologies and applying concepts appropriately
- returning tools and surplus resources as required
- updating work records
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- cleaning and making safe work area
- communicating and confirming technologies and concepts, including information technologies
- obtaining resources and materials, including performing ongoing checks
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- energy sector technologies and concepts, personal computers and computer hardware, including:
  - starting up
  - selecting application
  - entering information
  - saving
  - printing
  - structure and components and their function:

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    - motherboards, memory modules, video modules, connecting buses and storage devices
  - assembling and dismantling techniques
  - hardware faults and troubleshooting techniques (confined to sub-system level)
  - basic network hardware and components
  - connection of network media
  - set-up of standard network configuration
- communication techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant tools, equipment and personal protective equipment (PPE)
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply work health and safety (WHS)/occupational health and safety (OHS) regulations and codes of practices in the electrotechnology workplace.

It includes applying safe working practices, following workplace procedures for hazard identification and risk control. It also includes electrotechnology worker responsibilities and application for health and safety, risk management and adherence to safety practices as part of electrotechnology work functions when preparing to enter a work area.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter an electrotechnology workplace	**1.1** Work area access permits are obtained from appropriate person/s in accordance with workplace procedures

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	1.2	Relevant workplace WHS/OHS safety regulations and codes of practices are identified and followed when entering the electrotechnology work area
	1.3	Safe work methods for controlling risks are obtained, read and applied prior to undertaking work activity in accordance with WHS/OHS workplace procedures
	1.4	Preparation for electrical and non-electrical isolation is carried out to prevent creation of hazards from loss of machine/system/process control in accordance with WHS/OHS workplace procedures
	1.5	Tools, equipment and chemicals required for the electrotechnology work are checked for safety and correct functionality in accordance with workplace procedures and regulatory requirements
	1.6	Personal protective equipment (PPE) is worn appropriate to the electrotechnology work area and in accordance with workplace procedures
2 Apply safe electrotechnology working practices	**2.1**	Risk control work measures are implemented in accordance with WHS/OHS workplace procedures
	2.2	Procedures for dealing with accidents, fires and emergencies are followed in accordance with workplace procedures, scope of responsibility and capabilities
	2.3	Safe work methods are applied when working at heights including safe and effective use of safety equipment
	2.4	Safe work methods are used when undertaking lifting, lowering, pushing, pulling, carrying or otherwise moving, holding or restraining workplace tasks in accordance with relevant code of practice
	2.5	Safe work methods for removing an electric shock victim from a live electrical situation are demonstrated in accordance with workplace emergency management procedures
	2.6	Working area is kept clean, neat and tidy in accordance with workplace housekeeping procedures
3 Follow electrotechnology workplace procedures for hazard identification and	**3.1**	Hazards are identified, control measures implemented and reviewed through regular active participation in the consultation process with employer and other employees

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risk control

3.2 Hazards in the work area are identified and reported to relevant person/s in accordance with workplace procedures

3.3 WHS/OHS documentation and incident records are completed in accordance with regulatory requirements and workplace procedures

3.4 Workplace instructions are followed in accordance with regulatory requirements and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) regulations, legislation, codes of practices and procedures in the workplace, including:
  - identifying typical hazards associated with work environments and assessing risk/s in an electrotechnology workplace
  - applying and reviewing risk control measures to minimise, control or eliminate identified hazards
  - reporting hazards to relevant person/s
  - applying safe working practices/methods
  - contributing to WHS/OHS consultative processes
- following relevant workplace emergency management procedures and instructions relating to WHS/OHS and emergency incidents
- selecting and using appropriate personal protective equipment (PPE)
- applying correct manual handling techniques
- confirming (safe) isolation of an electrical supply and isolation of potential electrical and non-electrical hazards has been completed by an authorised person
- demonstrating safe methods of removing an electric shock victim from a live electrical situation
- selecting an appropriate ladder for a given situation and performing a safety check before use
- completing relevant WHS/OHS documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- effective verbal and written communication techniques
- electrotechnology work environment, including:
  - appropriate fire extinguisher for a given type of fire
  - commonly used workplace safety signs

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  - relevant industry standard for safe workplace procedures
  - risk assessment documentation
  - typical hazards associated with a range of work environments
  - use of fire extinguishers
  - housekeeping and potential hazards in relation to improper housekeeping
  - workplace procedures used to control the risks associated with workplace hazards
- legal requirements relevant to WHS/OHS in the workplace, including:
  - appropriate personal protective equipment (PPE)
  - asbestos awareness and reporting hazardous gases, including supervisory requirements and duty of care
  - difference between hazards and risks
  - duty holder responsibilities, as specified in WHS/OHS Acts, regulations and codes of practice
  - employer and employee responsibilities, rights and obligations
  - general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
  - hazards that may be present in the electrotechnology workplace, the harm they can cause and how this harm occurs
  - housekeeping and potential hazards in relation to improper housekeeping
  - major functions of safety committees and representatives
  - powers of health and safety inspectors
  - relevant WHS/OHS regulations, codes and practices
  - underlying principles of WHS
- life support - cardiopulmonary resuscitation (CPR) in the workplace, including:
  - first aid
  - responsibilities of the first aider
  - priorities of first aid management for any accident or injury
  - procedures required at an accident scene
  - legal and ethical issues, which may impact on the management of care
  - 'duty of care'
  - examination of a casualty for injuries
  - effect of cardiopulmonary arrest on the body
  - managing simulated conditions of airway obstruction, respiratory arrest and cardiopulmonary arrest
  - single and two-person CPR
  - signs and symptoms of an altered level of consciousness
  - management of simulation of a casualty with an altered level of consciousness
  - signs and symptoms of shock
  - management of simulation of a casualty in shock
- relevant safe work method statements (SWMS)/job safety analysis (JSA) or risk mitigation processes, including:

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- emergency management plan
- hierarchy of WHS/OHS hazard risk control measures
- principles of risk assessment/management and required documentation

- typical hazards associated with electrotechnology work environments and their control, including:
  - asbestos, including:
    - common types of asbestos containing building materials
    - warning signs used to identify the presence of asbestos
    - effects of asbestos on the human body
    - requirements for reporting the presence of asbestos
  - silica, including:
    - types of materials that contain crystalline silica (silica dust)
    - methods of releasing silica dust
    - recommended levels of exposure to crystalline silica
    - effects of crystalline silica on the human body
  - hazardous gases
  - chemicals in the workplace, including:
    - hazardous substances and dangerous goods and their classifications
    - labelling and storage requirements for chemicals
    - purpose and interpretation of safety data sheets (SDS)/material safety data sheets (MSDS)
  - confined spaces, including:
    - control measures for working in a designated confined space
    - hazards associated with working in a confined space
    - workplace situations that could be classified as a confined space
  - physical and psychological hazards, including excessive noise, vibration, thermal stress, radiation, lasers, occupational overuse syndrome, stress, drugs and alcohol
  - safe manual handling principles, including:
    - procedures and methods for manual handling
    - situations that may cause manual handling injuries
    - types of manual handling injuries and their effect
  - working at heights, including:
    - hazards and precautions associated with working on ladders, elevated work platforms (EWP) and scaffolds
    - identification of work area as a height risk and use appropriate safety equipment to prevent a fall
  - working safely with electricity, including:
    - effects of electric shock on the human body
    - protection offered by a residual current device (RCD)
    - need for ensuring the (safe) isolation of an electrical supply

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- appropriate method of removing an electric shock victim from a live electrical situation
- precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and RCDs)
- common causes of electrical accidents.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, emergency management plan, equipment specifications, regulations, codes of practice and operation manuals
- relevant WHS/OHS legislation, regulations and codes of practice related to hazards management in the electrotechnology industry and workplace.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0008 Carry out preparatory energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to carry out preparatory energy sector work activities.

It includes planning and carrying out energy sector work support activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan energy sector support activity	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS hazards are identified, risks assessed and control measures implemented for energy sector work preparation

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	1.3	WHS/OHS hazards not previously identified are noted on job safety assessments and advice is sought from work supervisor
	1.4	Work instructions are obtained and the nature, scope and location of work is determined from the supervisor or appropriate person/s
	1.5	Advice is sought from supervisor or appropriate person/s to ensure work is coordinated effectively with others
	1.6	Materials required for work are determined in accordance with workplace procedures
	1.7	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Undertake energy sector support activity	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Plant and equipment are checked in accordance with manufacturer guidelines/instructions, WHS/OHS requirements and workplace procedures
	2.3	Mechanical equipment is installed straight and square in the required locations and within acceptable tolerances in accordance with relevant industry standards
	2.4	Hand and power tools are used in accordance with safe working practices and WHS/OHS requirements and workplace procedures
	2.5	Work instructions are carried out under supervision
	2.6	Unplanned events are referred to relevant supervisor and directions are followed in accordance with workplace procedures
3 Complete energy sector work activity	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work site is cleaned and made safe in accordance with workplace procedures
	3.3	Supervisor is notified of work completion in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE122A Carry out preparatory energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0008 Carry out preparatory energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using of risk control measures
- carrying out preparatory energy sector work activities in accordance with requirements, including:
  - maintaining fire integrity
  - placing and securing accessories accurately
  - routing, placing and securing cables
  - using testing devices
  - using hand and power tools safely and in accordance with workplace safe work practices
- completing energy sector work and following instructions
- planning and undertaking energy sector support activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques for unplanned situations/events
- relevant hand, fixed and portable power tools, including:
  - associated hazards
  - care and maintenance
  - cutting, shaping, drilling, threading, tapping, and finishing metallic, non-metallic and structural components
  - different types of tools and their purpose
  - requirements for use on construction sites
  - techniques for the correct and safe use
  - tools for dismantling and assembling electrical and electronic components
  - tools for measuring and marking out

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- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant energy sector testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective (PPE) equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0009 Carry out routine work activities in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to carry out work activities in an energy sector environment.

It includes preparing, carrying out work activities in the energy sector and checking the quality of the work completed.

Practice in the workplace and during training is also subject to regulations directly related to work health and safety (WHS)/occupational health and safety (OHS) and where applicable contracts of training, such as apprenticeships.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare work activity	**1.1** Work instructions for preparing work activity are obtained and confirmed

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	1.2	WHS/OHS policies and workplace procedures are communicated, confirmed and applied
	1.3	Tools, equipment and personal protective equipment (PPE) necessary for work are identified, checked and are safe to use in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure work is coordinated effectively with others
	1.5	Resources and materials required for work are confirmed, scheduled and obtained in accordance with workplace procedures
	1.6	Schedule of work and safe work practices are confirmed in accordance with work instructions and job requirements
2 Carry out work activity	**2.1**	WHS/OHS policies and workplace procedures for safe work practices are followed to eliminate or minimise incidents
	2.2	Schedule of work is followed to ensure work is completed in agreed timelines, quality standard and with a minimum of waste
	2.3	Electrotechnology practices and electrical principles are applied to routine work activities
	2.4	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.5	Quality checks of work are undertaken in accordance with work instructions and workplace procedures
3 Check completed work	**3.1**	Checks are made to ensure work activity is in accordance with work instructions and job requirements
	3.2	Relevant person/s is notified of work activity completion
	3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned, made safe and sustainable energy practices are followed

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3.5 Workplace records are updated in accordance with work instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE148A Carry out routine work activities in an energy sector environment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0009 Carry out routine work activities in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- carrying out work activities in an energy sector, including:
  - applying industry standards
  - applying quality, workplace procedures and instructions
  - applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
  - applying sustainable energy practices
  - completing schedules of work
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - following quality, workplace procedures and instructions
  - obtaining and checking tools and equipment
  - returning tools, equipment, personal protective equipment (PPE), surplus resources and materials
  - updating work records.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- energy sector vocations, including:
  - electrical
  - electronics and communications
  - computer systems
  - data communication
  - refrigeration and air conditioning
  - instrumentation and control
  - rail signalling

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  - lifts
  - electricity supply – generation, transmission and distribution
  - gas industry
- career paths in energy sector, including:
  - Australian policy framework for qualifications/classifications
  - scope of work for the installation, maintenance and servicing sector
- training in energy sector vocations, including:
  - traineeships and apprenticeships
  - minimum electrical licencing requirements
  - career pathways and awards
- industry stakeholders, including:
  - employer and employee organisations
  - government electrical regulatory authorities and skills standards networks
  - private and public Registered Training Organisations (RTOs)
- qualification requirements, including:
  - units of competency and qualification assessments
- employment preparation, including:
  - job application involving research, writing and methods to apply
  - job interview consisting of preparation and presentation
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instruction for tools, equipment and technologies
- relevant sustainable energy practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0010 Compile and produce an energy sector detailed report

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to compile and produce an energy sector detailed report.

It includes planning; identifying information sources; collecting, analysing and formatting information applicable to the electrotechnology industry in developing and obtaining approval for energy sector report.

This unit is typically for technicians working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Identify energy sector report requirement**	**1.1** Work health and safety (WHS)/occupational health safety (OHS) requirements and workplace procedures are identified and applied
		1.2 Report writing techniques are reviewed and adopted in accordance with workplace procedures
		1.3 Scope and parameters of energy sector report are evaluated and identified in accordance with workplace procedures
		1.4 Criteria from other related works impacting on the report development are determined from relevant sources
		1.5 Report information and sources are identified, and availability and reliability of information is assessed for relevance
2	**Develop energy sector report**	**2.1** Scenarios/requirements identified in consultation with relevant person/s and industry regulatory and job requirements are included in report
		2.2 Report is developed in collaboration with relevant person/s
		2.3 Relevant person/s is identified to assist in the compilation of the report
		2.4 Report is reviewed and adjusted to rectify anomalies
		2.5 Report is compiled in accordance with workplace policies and procedures
		2.6 Research information is analysed and compiled for the final report
3	**Obtain approval for final energy sector report**	**3.1** Report is presented, discussed and authorised by relevant person/s
		3.2 Modifications to report resulting from presentation/discussion with authorised person/s are negotiated
		3.3 Final report is presented and approval obtained from authorised person/s

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE124A Compile and produce an energy sector detailed report.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0010 Compile and produce an energy sector detailed report

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- analysing energy sector report information
- applying relevant work health and safety (WHS)/occupational health safety (OHS) requirements
- collaborating with relevant person/s in compiling report
- compiling and producing an energy sector report, including:
  - identifying workplace policies and procedures
  - developing report brief incorporating scenarios and requirements
  - communicating with relevant person/s to determine report requirements
  - identifying scope and parameters of report
  - determining impact of related works
  - developing design brief incorporating scenarios and all requirements
- identifying source, availability and reliability of information for report
- obtaining approval for final energy sector report
- presenting and discussing report with relevant person/s, including presenting final report and reviewing and adjusting report to rectify anomalies
- successfully negotiating alterations to proposed report.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- communicating with personnel, including:
  - oral communications
  - written procedures and work instructions
- communicating with suppliers
- communicating with customers
- purpose and extent of maintaining work activities records in an enterprise, including:

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    - types of records for maintaining work activities in an enterprise
    - methods for recording and maintaining work records
    - work records required by regulation requirements
    - using basic computer functions including:
        - starting up
        - selecting application
        - entering information
        - saving
        - printing
- techniques of analysis, including:
    - use of appropriate sampling techniques to collect data
    - types of data and classification
    - effective questionnaire design
    - data collection errors
    - frequency tables
    - statistical diagrams drawing and interpretation
    - the general shape of a frequency distribution
    - different types of diagrams
    - mean time between failures calculations
- summary of statistics, including:
    - measures of central tendency
    - measures of dispersion
    - a 5-point summary for a given data set, box and whisker plot distribution
    - data sets comparison using measures of centre and spread
    - the effect of outliers on measures of centre and spread
    - use computer programs or calculators to simplify calculations
- correlation and regression, including:
    - bivariate data and scatter diagrams
    - product-moment correlation coefficient calculation and interpretation
    - difference between causation and correlation
    - equations of regression lines from bivariate data with a calculator and line plotting on a scatter diagram
    - using the equation of regression to make predictions in practical situations
    - investigation of practical problems using correlation and regression
- investigation and reporting, including:
    - presentation of a well formatted report with a clearly stated aim
    - using the internet to obtain relevant data
    - description of the statistical method and design chosen to meet the aim of the investigation
    - statistical analysis and results reporting

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  - evaluation and interpretation of the results of the investigation
  - discussion of the investigation with reference to real world applications
  - chronology of the investigation
- analysis techniques
- collaboration and communication techniques
- presentation and negotiation skills
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- report writing techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0011 Comply with scheduled and preventative maintenance program processes

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to comply with the quality assurance and risk management processes for scheduled and preventative maintenance of the electrotechnology aspects of plant and equipment.

It includes working safely and to technical, quality and risk management standards, work specifications and maintenance schedules; sampling inspections; evaluating components and completing the necessary maintenance documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to comply with scheduled maintenance program process	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Hazards are identified, risks assessed and control measures implemented
	1.3	Maintenance schedule and process compliance requirements are confirmed with relevant person/s and work appropriately sequenced in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure the work is coordinated effectively with others involved on the work site
	1.5	Location of equipment to be maintained is determined from maintenance schedule and/or system specifications and diagrams
	1.6	Resources required to conduct the maintenance are obtained in accordance with workplace procedures and checked against job requirements
	1.7	Tools, equipment and testing devices required to conduct the maintenance are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Comply with scheduled maintenance program process	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Inspecting, testing or measuring on live and operating systems is conducted in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated as required in accordance with WHS/OHS requirements and workplace procedures
	2.4	Apparatus/components to be maintained are inspected and evaluated for compliance in accordance with maintenance schedule and operational and WHS/OHS requirements and workplace procedures
	2.5	Non-compliant apparatus/components are documented and arrangements made for rectification in accordance with workplace procedures
	2.6	Methods for dealing with unplanned situations are discussed with relevant person/s and documented in accordance with workplace procedures

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	2.7	Quality checks of the maintenance are undertaken in accordance with workplace procedures
	2.8	Maintenance process compliance is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete maintenance compliance process	**3.1**	WHS/OHS risk control measures and workplace procedures for work completion are followed
	3.2	Work site and equipment are cleaned and made safe in accordance with WHS/OHS requirements and workplace procedures
	3.3	Final checks are made to verify that maintenance complies with WHS/OHS requirements, manufacturer specifications and workplace procedures
	3.4	Maintenance completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Complying with scheduled and preventative maintenance processes must include at least the following:

- three different items of installed equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE009B Comply with scheduled and preventative maintenance program processes.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0011 Comply with scheduled and preventative maintenance program processes

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
  - checking tools, equipment and testing devices for correct operation and safety
- applying sustainable energy principles and practices
- communicating effectively with relevant stakeholders
- complying with scheduled and preventative maintenance program processes, including:
  - interpreting maintenance schedule requirements correctly
  - following quality assurance and risk management compliance processes
  - following maintenance schedule
  - inspecting and evaluating apparatus for quality assurance and risk compliance
  - arranging for corrective action of non-compliant apparatus
  - documenting maintenance work
- consulting relevant person/s to coordinate maintenance
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining location of equipment maintenance
- ensuring circuits/machines/plant are isolated
- interpreting system specifications and diagrams
- maintaining a clean worksite and equipment
- obtaining relevant resources to conduct maintenance
- performing regular quality checks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- corrective action procedures for non-compliant apparatus
- data acquisition, including:
  - plant history cards/files
  - inspection techniques
  - predictive maintenance
  - remote visual inspection
  - non-destructive testing
  - thermography
  - vibration analysis
  - oil analysis
- maintenance plan, including:
  - characteristics of plant operation
  - assessment of failure characteristics
  - link failure characteristics to maintenance systems
  - identify production windows
  - resources
  - labour
  - materials
  - establish plan
  - implementation procedures
- maintenance principles, including:
  - maintenance function
  - role of maintenance department
- maintenance systems, including:
  - maintenance terminology
  - preventative maintenance
  - predictive maintenance
  - corrective maintenance
- quality assurance compliance processes
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- review of maintenance plan, including:
  - analysis of records
  - manual and electronic recording methods
- scheduled and preventative maintenance process
- sustainable energy principles and practices
- techniques to inspect and evaluate apparatus for quality assurance and risk compliance.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0012 Contribute to risk management in electrotechnology systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to contribute to risk management in electrotechnology systems.

It includes contributing to the identification of electrotechnology systems risks and risk events, the likelihood and consequences of events, evaluating risk, risk management planning and mitigation of risk.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Contribute to the identification of risks and development of management strategies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of program or project is identified from design brief specification and/or relevant documentation and in consultation with relevant person/s
	1.3	Potential, perceived and actual risk events in electrotechnology systems risks are identified for contribution, documented and analysed in consultation with relevant person/s in accordance with workplace procedures
	1.4	Risk management methods, tools and techniques are used in the analysis and documentation of identified risk events
	1.5	Risk management techniques are used to analyse electrotechnology systems risks and risk events, options are assessed and risk approaches recommended to relevant person/s for approval
	1.6	Draft risk management processes and workplace procedures are developed and communicated with stakeholders for the management of risk factors
	1.7	Risk management processes and workplace procedures are submitted to relevant person/s for approval in accordance with workplace procedures
	1.8	WHS/OHS risk control measures are submitted for incorporation in risk management strategies in accordance with workplace procedures and relevant industry standards
2 Contribute to the implementation and monitoring of risk management strategies	**2.1**	Risk management processes and workplace procedures are produced for incorporation into work and project plans to ensure outcomes are achieved
	2.2	Activities are monitored to identify variations and responses are submitted to relevant person/s for approval in accordance with risk management processes and workplace procedures
	2.3	Agreed risk responses are revised for implementation contribution and plans modified to reflect changing project objectives in accordance with risk management processes and workplace procedures
3 Contribute to the evaluation of risk	**3.1**	Project outcomes are reviewed for contribution with relevant person/s to determine effectiveness of risk

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management strategies		management processes in accordance with workplace procedures
	3.2	Risk issues and recommended improvements are identified, documented and submitted to relevant person/s for approval to be incorporated into ongoing and/or future program, project or plans
	3.3	Outcomes are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE078B Contribute to risk management in electrotechnology systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0012 Contribute to risk management in electrotechnology systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- contributing to identifying potential, perceived and actual risk events
- contributing to incorporating risk management strategies and condition monitoring of plant and equipment with criteria for repair and/or replacement
- contributing to incorporating risk management processes and workplace procedures into program, project and/or plans
- developing risk management processes and workplace procedures for agreement by stakeholders
- identifying improvements and documenting recommendations
- identifying the scope of program or project
- monitoring to identify and responding to variations
- reviewing project outcomes
- using risk management methods, tools and techniques in analysis and reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant plant and equipment
- relevant risk management, applications, practices and techniques, including:
  - principles of risk assessment - planning and prioritisation
  - principles of risk management procedures
  - principles of risk mitigation – handling and monitoring
  - relevant potential, perceived and actual risk events
  - relevant risk management methods, tools and techniques

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  - risk management principles
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including
  - program, project and/or plans
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to contributing to risk management in electrotechnology systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0013 Develop and implement energy sector maintenance programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop and implement energy sector maintenance programs.

It includes preparing, developing and implementing maintenance programs. It also includes evaluating risks associated with equipment failure; developing maintenance frequency; adhering to repair/replacement policies; and developing, recording and reporting system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare maintenance requirements for energy sector	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace

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		procedures in preparation for the work are followed
	1.3	WHS/OHS and workplace procedures are developed for required practice skills, frequency and level of maintenance work
	1.4	Maintenance program is determined from plant performance specifications and in consultation with relevant person/s
	1.5	Relevant person/s is engaged to assess the risks with individual equipment failure
	1.6	Level and frequency of repair/replacement for maintenance work is identified following manufacturer instructions in accordance with WHS/OHS and relevant industry standards
	1.7	Systems to manage and record maintenance work are identified in accordance with workplace procedures and relevant industry standards
2 Develop and implement maintenance program	**2.1**	Schedules detailing maintenance levels and frequency for equipment items are developed in accordance with risk assessment reports and manufacturer instructions
	2.2	Workplace procedures for the maintenance program are developed and implemented in accordance with workplace schedule and relevant industry standards
	2.3	Workplace procedures for records to be maintained are developed and implemented in accordance with workplace schedule and relevant industry standards
	2.4	Maintenance program is documented in accordance with relevant industry standards and workplace procedures
3 Evaluate maintenance program	**3.1**	Periodic and sample inspection reports are used for maintenance quality and revision of maintenance schedule and frequency in accordance with workplace procedures
	3.2	Maintenance schedule is reviewed and revised to maintain equipment to acceptable level in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing and implementing energy sector maintenance programs must include producing one workplace maintenance program and include at least ten different types of items included in the schedule:	• elements or variables included in the schedule

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE110A Develop and implement energy sector maintenance programs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0013 Develop and implement energy sector maintenance programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- determining the maintenance program from specifications and relevant person/s
- developing a maintenance record system
- developing maintenance schedule implementation procedures
- developing maintenance program and evaluation procedures
- documenting the maintenance program
- identifying the level and frequency of repair/replacement maintenance
- preparing maintenance requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant equipment
- relevant industry standards
- relevant maintenance principles
- relevant maintenance systems maintenance plan
- relevant manufacturer specifications and operating instructions
- relevant plant performance specifications
- relevant review of maintenance plan
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - periodic and sample inspection reports

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- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to developing and implementing maintenance programs
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0014 Develop design briefs for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop design briefs for electrotechnology projects.

It includes preparing and developing project design briefs. It also includes obtaining approval of designs.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop project design briefs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for project planning are reviewed and applied in accordance with workplace procedures

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	1.3	Project is evaluated and parameters determined using a formal evaluation/survey in accordance with workplace procedures
	1.4	Relevant person/s is consulted and/or site visits conducted to identify other works impacting on project
	1.5	Project budget is determined by deliverables and quality in accordance with workplace procedures and project parameters
2 Develop design proposal	**2.1**	Project design brief is developed with scenarios/requirements in consultation with relevant person/s and in accordance with relevant industry standards
	2.2	Project design brief is developed in collaboration with relevant design professional/s and/or contractor/s involved in the project
	2.3	Relevant person/s required for the project is identified and their role/s specified in the project design brief
	2.4	Project design brief is reviewed against inputs and adjusted to rectify any anomalies
	2.5	Project design brief proposal is documented in accordance with workplace procedures
3 Obtain approval for project design briefs	**3.1**	Project design brief is presented and discussed with relevant person/s
	3.2	Alterations to the project design brief resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final project design brief is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing requirements to be incorporated into the design of electrotechnology projects must include at least the following:

- safety requirements met
- client expectations established
- cost-effective solutions pursued and assured
- design requirements documented

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE015B Develop design briefs for electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0014 Develop design briefs for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining the impact of other related works
- developing project design brief incorporating scenarios and all requirements
- documenting project plan proposal
- establishing the scope and parameters of the project
- identifying competencies required for the project
- negotiating alterations to the proposed project design brief successfully
- obtaining approval of the final brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- purpose of critical path analysis
- purpose of customer relations
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant project parameters and budget requirements
- relevant scenarios/requirements
- relevant techniques for project planning
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation, including
  - project design brief proposal
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing project design briefs for electrotechnology projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0015 Develop engineering solutions to photonic system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions to photonic system problems.

It includes preparing and developing engineering solutions for photonic systems problems, and applying problem-solving techniques. It also includes testing, documenting and implementing engineering solutions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0065 Solve problems in basic electronic circuits

or

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for photonic systems problems	**1.1** WHS/ OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Photonic system problems are determined from performance specifications and/or reports and in consultation with relevant person/s
	1.4 Activities are planned in accordance with workplace procedures for timelines in consultation with others involved
	1.5 Strategies are identified, developed and implemented
2 Develop engineering solutions	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Photonic technology, operation, device characteristics and applications are applied to developing solutions to photonic system problems
	2.3 Parameters, specifications and performance requirements of photonic system problems are obtained in accordance with workplace procedures
	2.4 Resolving photonic system problems is analysed to provide solutions in accordance with workplace procedures

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	2.5	Unplanned events are responded to in accordance with WHS/OHS requirements and workplace procedures
	2.6	Quality of work is monitored and responded to in accordance with workplace procedures and/or relevant industry standards
3 Test, document and implement engineering solutions for photonic problems	**3.1**	Solutions to photonic problems are tested and modified as required in accordance with workplace procedures
	3.2	Solutions and instructions for implementation are documented in accordance with WHS/OHS requirements and workplace procedures
	3.3	Relevant person/s required to implement solutions to photonic system problems is coordinated in accordance with relevant industry standards and workplace procedures
	3.4	Justification for solutions used to solve photonic system problems is documented in work records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions must include the following:

- at least two solution applications

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE128A Develop engineering solutions to photonic system problems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0015 Develop engineering solutions to photonic system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining photonic system problems
- developing engineering solutions for photonic system problems
- documenting instruction for implementation of solutions
- documenting justification of solutions implemented
- forming strategies for solution development and implementation
- implement engineering solutions for photonic system problems
- obtaining photonic system parameters, specifications and performance requirements
- preparing to develop engineering solution for photonic system problems
- testing and solving photonic system problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant development and implementation strategies
- relevant industry standards
- relevant manufacturer specifications
- relevant photonic principles and applications, including:
  - components for wavelength-division multiplexing (WDM) systems
  - concepts of optical transmission

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  - environmental advantages and impacts of optical technology
  - geometric optics
  - introduction to photonic components
  - operating principles of optical couplers and their characteristics
  - operational principles of key photonic devices
  - photonic components and component technologies
  - photonic components and their roles in photonic devices
- relevant job safety assessments or risk mitigation processes
- relevant testing techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instruction, quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solutions to photonic system problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Duplicate content removed from Knowledge Evidence.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify, document and apply work health and safety (WHS)/occupational health and safety (OHS) hazard and risk control measures associated with electrotechnology work.

It includes identifying workplace hazards, assigning levels of risk, developing control measures to eliminate and/or mitigate risks, reviewing risk control measures and maintaining documentation of hazards, risk control measures and their application in accordance with compliance procedures.

This unit addresses information, processes and techniques for the application of WHS/OHS, specific to working in the electrotechnology sector and is essential for workers without managerial or supervisory responsibilities.

Typically, this unit will relate to the type of job being undertaken, electrical conditions, energy levels, radiation levels, toxic substances, airborne particles, pressure discharge, explosive atmosphere, worksite location, general worksite conditions, specific work location, moving parts, tools and equipment, workers competence and/or capacity and/or personal effects.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify and document hazards and risks associated with electrotechnology work	**1.1** Hazards are identified and documented by undertaking a job analysis and worksite inspection in consultation with relevant person/s and in accordance with workplace procedures
	1.2 Risks associated with identified hazards are assessed in consultation with relevant person/s, taking into account existing control measures and documented in accordance with workplace procedures
2 Assign levels of risk and develop and document control measures	**2.1** Level of risk is assessed and prioritised for each identified hazard in consultation with relevant/s persons and in accordance with regulations and WHS/OHS workplace compliance procedures
	2.2 Control measures for identified hazards are determined by applying the hierarchy of control and activities to eliminate and/or mitigate the risk
	2.3 Level of risk is re-assessed to confirm the required control measures reduce the risk level to as low as reasonably practicable
	2.4 Hazards risk level and control measures are agreed to in consultation with relevant stakeholders and documented in accordance with workplace procedures
3 Monitor, review and document risk control measures	**3.1** Documented control measures are recorded in workplace risk register and made available for reference by relevant person/s
	3.2 Control measures are reviewed and modified, as required, in consultation with relevant person/s in accordance with workplace procedures
	3.3 Document and apply measures to control WHS/OHS risks associated with electrotechnology work

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3.4 Changes and updates are made to relevant documentation, risk register as additional hazards are identified

3.5 Documentation of hazards, risks control measures and their application are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Documenting and applying WHS risks must be demonstrated in relation to electrotechnology installation, testing, inspection, fault finding, maintenance or development work functions and include the following:

- relevant WHS/OHS legislation, regulations and codes of practice related to devices and systems and hazards present in residential, commercial and industrial workplaces
- accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace or organisation

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Duplicate content removed from Knowledge Evidence.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying measures to control work health and safety (WHS)/occupational health and safety (OHS) risks, including:
  - identifying hazards by job analysis and/or work-site inspection
  - documenting hazards
  - determining risks associated with identified hazards
  - determining the degree of risk in consultation with relevant person/s and in accordance with workplace requirements and documenting the level of risk
  - working with a group to identify effective hazard control measures
  - working with a group to modify and/or develop safe work methods
  - utilising the hierarchy of control to develop reasonably practicable control measures to eliminate or control risk
  - reassessing the level of risk and documenting the reassessed level of risk
  - documenting control measures
  - updating worksite risk register
  - monitoring, reviewing relevant control measure documentation to ensure control measures remain valid
  - reviewing job-specific and/or worksite processes to ensure control measures remain valid
  - identifying job-specific and/or worksite changes and modifying hazard, risk and control measure documentation
  - following workplace requirements for filing control measure documentation
  - identifying practical control measures for dealing with the hazards on a construction worksite
  - identifying practical control measures for dealing with the hazards of low voltage (LV)

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equipment
- identifying practical control measures for dealing with the hazards of high voltage (HV).

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- risk management and assessment of risks, including:
  - principle and purpose of risk management
  - processes for conducting a risk assessment
  - hazard identification by job analysis and work-site inspection
  - recording hazards and assessing risk
- recognising and assigning a level of risk, including:
  - high (potential to kill or permanent disability)
  - medium (potential to cause an injury or illness of a permanent nature)
  - low (potential to cause a minor injury requiring first aid but no permanent disability)
  - the likelihood of an incident happening
  - risk level matrix
- identifying control measures to eliminate or control risk, including:
  - hierarchy of control measures
  - what constitutes a reasonably practicable control measure
  - monitoring and reviewing processes to ensure control measures remain valid
- control measure documentation, including:
  - job safety analysis (JSAs)
  - safe work method statements (SWMS)
  - risk registers
  - relevant industry standards
- construction site hazards, risks and control measures, including:
  - manual and mechanical handling
  - noise, dusts, gases and chemicals
  - working at heights
  - working in confined spaces
  - harmful airborne contaminants: fibres of thermal insulation, fibrous cement materials, asbestos, silica and other fibres in insulation materials
  - harmful devices: laser equipped devices, gas torches and welding equipment
  - harmful materials: gases including refrigerants, industrial cleaning agents, fibres of optical cable, thermal insulation, glues and other setting agents
- hazards, risks and control measures associated with HV, including:
  - control measures used for dealing with the hazards of HV

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  - parts of an electrical system and equipment where HV is likely
  - the terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’, ‘stored energy’ and ‘creepage’ as they relate to the hazards of HV
  - Australian and New Zealand Standards (AS/NZS) requirements for safety services and issues related to HV installations
  - consultation and the requirement for the use of authorised personnel for undertaking isolations, maintenance and reporting of faults (including permit requirements)
- hazards, risks and control measures associated with LV equipment, including:
  - risks in modifying electrical installations, fault finding, maintenance and repair
  - control measures before, while and after working on electrical installations, circuits and equipment
  - isolation and tagging-off procedures
  - risks, restrictions and control measures for working live
  - alternate supplies
- hazards associated with extra-low voltage (ELV), LV and high currents, including:
  - arrangement of power distribution and circuits in electrical installations
  - parts of an electrical system and equipment that operate at LV and ELV, and, where high currents are likely
- hazards, risks and control measures associated with disconnecting and reconnecting electrical equipment, including:
  - isolation and tagging-off procedures
  - alternate supplies (back-up supply and changeover switches).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEECD0017 Establish and follow a competency development plan in an electrotechnology engineering discipline

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine and follow a competency development plan in an electrotechnology engineering discipline.

It includes identifying competency development plan, following activities for developing competency, pursuing opportunities to develop competencies, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify competency development plan	**1.1** Competency development plan requirements are identified in accordance with workplace procedures and in consultation with relevant person/s

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	1.2	Obligations and expectations of the competency development plan are obtained and applied
2 Prepare for competency development plan activities	**2.1**	Work activities are obtained and applied in accordance with workplace procedures and relevant industry standards
	2.2	Work instructions are followed and clarification is sought from relevant person/s
	2.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures and with the approval of relevant person/s
3 Monitor and report competency development plan	**3.1**	Competency development plan is confirmed in consultation with relevant person/s
	3.2	Components of competency development plan are followed in accordance with workplace procedures
	3.3	Opportunities to practise skills and apply knowledge to a competency activity are applied
	3.4	Assistance is sought from relevant person/s as required in developing skills and applying knowledge relevant to a competency activity
	3.5	Progress in activities is monitored against competency development plan in accordance with relevant industry standards and workplace procedures
	3.6	Modifications to competency development plan are made in consultation with relevant person/s
	3.7	Competency development activities are reported in accordance with relevant industry standards and workplace procedures
	3.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE083A Establish and follow a competency development plan in an electrotechnology engineering discipline.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0017 Establish and follow a competency development plan in an electrotechnology engineering discipline

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying duties and responsibilities of competency development plan
- applying opportunities for gaining the range of workplace experience/s
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned situations in accordance with relevant industry standards and workplace procedures
- dealing with unplanned situations with the approval of relevant person/s
- following relevant industry standards and workplace procedures
- following work instructions and seeking clarification
- identifying competency development plan requirements
- progressing with activities monitored against competency development plan
- reporting competency development activities in accordance with workplace procedures
- reviewing progress of the competency development activities in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- monitoring and reporting requirements of competency development plan
- obligations and expectations of competency development plan
- problem-solving techniques
- relevant components of a competency development plan
- relevant industry standards and workplace procedures
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation, including:
  - competency development activities report
  - development plan
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in, developing and following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0018 Establish, maintain and evaluate energy sector WHS/OHS systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to establish, maintain and evaluate energy sector work health and safety (WHS)/occupational health and safety (OHS) systems.

It includes understanding an organisation's WHS/OHS obligations; determining and maintaining participative arrangements, procedures for hazard identification, risk assessment and control measures; procedures for dealing with hazardous incidents, safety training and safety records; and evaluating the safety system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine and maintain framework for WHS/OHS system	**1.1** WHS/OHS policies are developed and implemented within management systems in accordance with workplace procedures and relevant industry standards

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		1.2	WHS/OHS responsibilities and duties included in job descriptions and duty statements for implementation and integration of the WHS/OHS system are defined and allocated for relevant positions
		1.3	Relevant resources for operation of WHS/OHS system are identified, obtained and/or provided in accordance with workplace procedures
		1.4	Information on WHS/OHS system and workplace procedures of managerial responsibility is provided and explained in a form accessible to employees
2	**Determine and maintain participative arrangements for management of WHS/OHS**	**2.1**	Relevant consultative workplace processes are determined and maintained in consultation with employees and representatives in accordance with WHS/OHS and workplace procedures
		2.2	Issues raised through participation and consultation are addressed and resolved in accordance with workplace procedures and timeframes
		2.3	Outcomes of participation and consultation are provided to employees in accordance with workplace procedures
3	**Determine and maintain procedures for identifying hazards assessing risk and controlling risk**	**3.1**	Existing and potential hazards are identified and confirmed in area of managerial responsibility in accordance with WHS/OHS records system and workplace procedures
		3.2	Workplace procedures for ongoing identification of hazards are developed and integrated within management systems of work
		3.3	Activities are monitored to ensure workplace procedures are implemented in area of managerial responsibility
		3.4	Hazard identification is addressed at planning, design and evaluation stages of any change in the workplace to prevent new hazards
		3.5	Risks presented by identified hazards are assessed in accordance with WHS/OHS and relevant industry standards
		3.6	Workplace procedures for ongoing assessment of risk are developed and integrated within systems of work in

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		accordance with workplace procedures
	3.7	Activities are monitored to ensure workplace procedures are implemented in area of managerial responsibility
	3.8	Risk assessment is addressed at planning, design and evaluation stages of any change in the area of managerial responsibility to ensure risk from hazards has not increased
	3.9	Control measures to assess risks are developed and implemented according to hierarchy of control in accordance with WHS/OHS records system
	3.10	Interim control measures are implemented for identified risk immediately until a practical control measure is developed
	3.11	Workplace procedures for ongoing risk control are developed and integrated in systems of work in accordance with hierarchy of control
	3.12	Activities are monitored to ensure the risk control workplace procedures are implemented in area of managerial responsibility
	3.13	Risk control is addressed at the planning, design and evaluation stages of any change within the area of managerial responsibility to ensure risk control measures are implemented
	3.14	Inadequacies in risk control measures are identified and resources enabling implementation of new measures are obtained and/or provided in accordance with hierarchy of control and workplace procedures
4 Determine and maintain procedures, training and systems for dealing with hazardous events	**4.1**	Potential hazardous events are correctly identified in accordance with WHS/OHS and workplace procedures
	4.2	Workplace procedures to control the risks associated with hazardous events are developed in consultation with relevant emergency services and relevant industry standards
	4.3	Relevant information and training are provided to employees to enable implementation of the workplace procedures in all relevant circumstances

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		4.4	WHS/OHS training program is developed and implemented to identify and fulfil employees' training requirements in accordance with workplace procedures
		4.5	WHS/OHS records system is determined and monitored for identification of patterns of injury and disease within the area of managerial responsibility
5	**Evaluate the WHS/OHS system and relevant policies, workplace procedures and programs**	**5.1**	WHS/OHS system and relevant policies, workplace procedures and programs are assessed in accordance with
		5.2	WHS/OHS system improvements are developed and implemented in accordance with workplace procedures
		5.3	WHS/OHS and relevant industry standards is assessed to ensure compliance with WHS/OHS is maintained

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE118A Establish, maintain and evaluate energy sector OHS systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0018 Establish, maintain and evaluate energy sector WHS/OHS systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- establishing and maintaining the framework for the work health and safety (WHS)/occupational health and safety (OHS) system
- establishing and maintaining participative arrangements for management of WHS/OHS
- establishing and maintaining procedures for identifying hazards, assessing risk and controlling risk
- establishing and maintaining procedures for dealing with hazardous events
- establishing and maintaining WHS/OHS training programs
- establish and maintaining a system for WHS/OHS records
- evaluating the WHS/OHS system and related policies, procedures and programs
- dealing with unplanned events
- addressing and resolving issues raised through participation and consultation
- addressing risk assessment and control at planning, design and evaluation stages of any change
- developing and implementing control measures to assess risks in hierarchy of control
- developing and integrating workplace procedures for ongoing assessment of risk
- identifying inadequacies in risk control measures
- implementing interim and ongoing control measures for identified risk immediately
- monitoring activities to ensure workplace procedure is implemented
- providing outcomes of participation and consultation to employees.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- energy sector WHS/OHS enterprise responsibilities, including:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance

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  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS
  - relevance of enterprise management systems to WHS/OHS
  - analysis of working environment and design of appropriate WHS/OHS systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- relevant manufacturer specifications and operating instructions
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to establishing, maintaining and evaluating WHS/OHS systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0019 Fabricate, assemble and dismantle utilities industry components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fabricate, assemble and dismantle utilities industry components using fitting and metal fabrication techniques.

It includes the safe use of hand tools, fixed and portable power tools; cutting, shaping, joining and fixing; using metallic and non-metallic materials; dismantling and assembling equipment; mechanical measurement and marking out; and, reading drawings/diagrams.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for dismantling, assembling and fabrication work	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified and applied in accordance with workplace procedures

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3	Work instructions and relevant workplace procedures, industry standards, codes of practice and regulations for dismantling, assembling and fabrication are identified and applied
	1.4	Scope of work to be undertaken is obtained from relevant documentation and from work supervisor
	1.5	Advice is sought from work supervisor to ensure work is coordinated effectively with other persons
	1.6	Materials required for work are identified and obtained in accordance with workplace procedures
	1.7	Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety
2 Dismantle and assemble utilities industry apparatus	**2.1**	WHS/OHS risk control measures and workplace procedures for dismantling and assembling apparatus are followed
	2.2	Circuits/apparatus/plant are checked and isolation confirmed in accordance with WHS/OHS workplace requirements and procedures
	2.3	Relevant tools are selected and used correctly and safely in accordance with manufacturer instructions and workplace procedures
	2.4	Relevant manufacturer guides and instructions are followed when dismantling and assembling apparatus
	2.5	Apparatus components are marked or tagged correctly during dismantling to ensure correct and efficient reassembly in accordance with workplace procedures
	2.6	Dismantled components and parts are stored to protect them against loss or damage in accordance with manufacturer instructions and workplace procedures
	2.7	Apparatus is dismantled and assembled without waste of materials and energy, damage to apparatus, the surrounding environment or services
	2.8	Unplanned events are referred to supervisor for

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		directions in accordance with workplace procedures
	2.9	Quality checks are carried out in accordance with workplace procedures
	2.10	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures
	2.11	Work supervisor is notified of dismantling and assembling apparatus completion in accordance with workplace procedures
3 Fabricate utilities industry components	**3.1**	WHS/OHS risk control measures and workplace procedures for fabricating components are followed
	3.2	Circuits/apparatus/plant are checked and isolated in accordance WHS/OHS workplace requirements and procedures
	3.3	Relevant tools and equipment are selected, used correctly and safely in accordance with manufacturer instructions and workplace procedures
	3.4	Drawings, diagrams and instructions for fabrication of mechanical components are followed in accordance with workplace procedures
	3.5	Component dimensions are determined directly by measuring, or by calculation from information supplied in job drawings and instructions
	3.6	Mechanical components are fabricated by measuring, marking out, cutting, joining and fixing accurately using relevant equipment and tools, minimising waste of materials and energy and/or damage to the surrounding environment or services
	3.7	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	3.8	Quality checks are carried out in accordance with workplace procedures
	3.9	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures
	3.10	Work supervisor is notified of fabrication completion in

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accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Hand tools must include:	• drills and drilling with different types of drills used in the electrotechnology industry • tools for holding, cutting, driving, shaping, breaking and bending materials • tools for cutting metallic and non-metallic material
Relevant workplace policies and procedures must include:	• circuits/apparatus/plant isolation procedures • workplace referral and reporting procedures
Sheet metal work must include:	• application of a range of fabrication material types • use of tools for cutting, bending, folding and punching sheet metals
Tapping and threading must include:	• tools for cutting internal and external threads to materials used for electrotechnology work
Workshop planning processes and materials must include:	• metallic and non-metallic materials used in the electrotechnology industry and their application

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE102A Fabricate, assemble and dismantle utilities industry components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0019 Fabricate, assemble and dismantle utilities industry components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy work practices to reduce waste when marking out
- complying with relevant electrical regulations and legislations
- consulting with work supervisor
- correctly marking, tagging and storing components during dismantling
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- drawing freehand mechanical components showing all information needed for its manufacture/fabrication
- fabricating, dismantling, assembling utilities industry components, including:
  - applying safety procedures when using holding and cutting tools
  - cutting a thread on metallic components
  - demonstrating safe use of a bench drill
  - dismantling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures
  - assembling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures
  - drilling metallic and non-metallic components
  - fabricating components using sheet metal and fabrication tools
- following manufacturer guides and instructions
- following work instructions
- holding and cutting materials accurately
- interpreting and completing workplace documentation
- interpreting mechanical drawings/diagrams and instructions used in the electrotechnology industry
- joining components using correct method and equipment
- laying out a drawing of mechanical components using engineering drawing convention

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- marking out, cut, bend, drill and join sheet metal
- measuring, calculating and marking out a project accurately in accordance with workplace procedures
- selecting and using portable power tools correctly and safely
- selecting and using relevant hand tools correctly and safely
- tapping and threading metallic and/or non-metallic components
- using vernier calipers and micrometers to measure components
- maintaining a clean worksite and equipment
- modifying metal enclosures
- demonstrating safe drilling practices
- modifying plastic enclosures
- performing quality checks
- planning for dismantling, assembling and fabrication work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- mechanical drawing interpretation and sketching, including:
  - industry drawing standards of mechanical components
  - abbreviations and symbols used in drawing of mechanical components
  - interpretation of mechanical drawings commonly used in the electrotechnology industry (orthogonal projection, third angle - detail and assembly drawings, and pictorial views)
  - laying out a drawing of mechanical components using engineering drawing convention
  - freehand drawings of mechanical components showing all information needed for its manufacture/fabrication
- workshop planning and materials, including:
  - methods used to work safely in an industrial work environment
  - typical non-electrical hazards in the workplace
  - control measures for dealing with hazards identified
  - type of metallic and non-metallic materials used in the electrotechnology industry and application of the common materials
  - planning process
- measuring and marking out, including:
  - reasons for measuring and marking out
  - sustainable energy work practices related to reducing waste when marking out
- holding and cutting materials, including:
  - procedures for using a range of tools for cutting, shaping, and finishing metallic and non-metallic materials
  - safety procedures when using holding and cutting tools

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- drills and drilling, including:
  - types of drills used in the electrotechnology industry
  - drilling metallic and non-metallic components
  - safe use of a bench drill
- tapping and threading including type and size of commonly used threads used in electrotechnology work
- general hand tools used in electrotechnology work
- joining techniques, including:
  - machine screws
  - welding, brazing or soldering techniques
- portable power tools in electrotechnology work, including:
  - applications of portable power tools
  - using portable power tools
  - fabricating components using power tools
  - requirements for testing and tagging cord connected electrical equipment
- compressed gas operated tools in electrotechnology work
- sheet metal work, including:
  - types of sheet metal materials used in the electrotechnology work
  - names and applications of the types of fabrication materials
  - techniques used in fabricating sheet metal, including cutting, bending, drilling/punching, joining and cutting mitres
  - marking out, cutting, bending, drilling and/or cutting and/or punching holes, joining and cutting mitred joints using sheet metal
  - sustainable energy work practices to reducing waste when fabricating using sheet metal
- low tolerance measurement, including:
  - tolerance
  - techniques in using vernier callipers and micrometers
- dismantling and assembly techniques, including procedures for ensuring the safe treatment of dismantled components
- relevant tools for specific tasks, including:
  - tapping and threading
  - general hand tools used in electrotechnology work
  - joining
  - portable electric power tools
  - dismantling and assembly techniques
  - measuring and marking out
  - holding and cutting metallic and non-metallic materials
  - sheet metal work

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0020 Fix and secure electrotechnology equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fix, secure and mount electrotechnology equipment to hollow walls, solid walls and metal fixings.

It includes the safe use of hand and portable tools/ power tools and the selection and safe application of fixing devices and supporting accessories/equipment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to fix and secure electrotechnology equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented

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	1.3	Scope of work to be undertaken is obtained from relevant documentation and/or from work supervisor
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6	Fixing devices are selected for their suitability for the environment, weight of the load they are supporting and sub-stratums into which they are being installed in accordance with manufacturer specifications and safe load limits
	1.7	Supporting accessories/equipment are selected for their suitability for the environment and ability to support and protect from damage in accordance with workplace procedures
	1.8	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Install fixing and support devices	**2.1**	Exposed and/or conductive parts, plant or machinery are confirmed as isolated in consultation with authorised person
	2.2	WHS/OHS risk control measures relevant to work site are followed
	2.3	Fixing devices are installed in accordance with manufacturer instructions, regulatory requirements and workplace procedures
	2.4	Support accessories/equipment are installed accurately in accordance with industry technical standards, regulatory requirements and job specifications
	2.5	Work is carried out without waste of materials or damage to apparatus or circuits, the surrounding environment or services and using sustainable energy practices
3 Complete fixing and support work	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Worksite is tidied and tools and equipment cleaned and

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	securely stored in accordance with workplace procedures
3.3	Relevant personnel are notified of work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fixing and securing electrotechnology equipment must include:	• installation • maintenance or development work functions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE105A Fix and secure electrotechnology equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0020 Fix and secure electrotechnology equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant workplace health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- communicating effectively with relevant stakeholders
- completing fixing and support work to electrotechnology equipment
- completing workplace documentation
- ensuring exposed and/or conductive parts, plant or machinery are isolated by an authorised person
- installing a fixing device and accessory capable of supporting up to 20 kilograms (kg) on the metal plate
- using appropriate fixing methods, tools and devices to install fixings to hollow walls, solid walls, brick, concrete and steel
- installing, aligning and adjusting fixing devices in accordance with manufacturer instructions and load limits, including installing relevant fixing support accessories/equipment
- maintaining a clean worksite and equipment
- selecting relevant fixing devices suitable for the environment they are being installed for loads, including:
  - less-than 5 kg
  - 5-20 kg
  - 20-50 kg
- selecting the correct device for supporting, fixing and protecting wiring/cabling/piping and functional accessories
- using fixing adhesives and tapes safely in accordance with manufacturer instructions and load limits
- using power drills, including selecting and changing drill bits and drill speeds.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- devices, tools, equipment and methods for supporting, fixing and protecting electrotechnology equipment wiring/cabling/piping and functional accessories, including:
  - hollow walls, wood, masonry blocks, plasterboard and panelling
  - fixing to metal
  - solid walls, including masonry and concrete structures
  - vertical and horizontal surfaces
  - fixing adhesives and tapes
  - securing and mounting types, load limits and safe installation
  - support accessories/equipment
- relevant electrical regulations and legislations
- relevant job safety assessments or risk mitigation processes
- relevant electrotechnology equipment manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0021 Identify and select components, accessories and materials for energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify and select components, accessories and materials for energy sector work activities.

It includes identifying, selecting and confirming components, accessories and materials for energy sector work activity selection.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0009 Carry out routine work activities in an energy sector environment

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify components, accessories and materials	**1.1** Work instructions for selecting components, accessories and materials are obtained and confirmed
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are

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		communicated, confirmed and applied
	1.3	Tools, equipment and personal protective equipment (PPE) are identified, checked and are safe to use in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.5	Resources and materials required for work activity are confirmed, scheduled and obtained in accordance with workplace procedures
2 Select components, accessories and materials	**2.1**	WHS/OHS policies and workplace procedures and safe work practices are followed
	2.2	Schedule of work for selecting components, accessories and materials are followed to ensure work is completed in accordance with agreed timelines, quality standard and with a minimum of waste using appropriate technology
	2.3	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.4	Quality checks of work are undertaken in accordance with work instructions and job requirements
3 Confirm components and materials selection	**3.1**	Checks are made to ensure selection of components, accessories and materials are in accordance with work instructions
	3.2	Relevant person/s is notified of completion of the selection process
	3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned, made safe and sustainable energy practices are followed
	3.5	Workplace record/s are updated in accordance with work instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Identifying and selecting components/accessories/materials for energy sector work activities must relate to at least one of the following disciplines:	• appliances • business equipment • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE179A Identify and select components, accessories and materials for energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0021 Identify and select components, accessories and materials for energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following schedule of work
- locating, scheduling and obtaining resources and materials required for work
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying and checking required tools, equipment and personal protective equipment (PPE)
- identifying and selecting components, accessories and materials, including:
  - confirming selection of components, accessories and materials
  - obtaining, checking and returning tools, equipment, surplus resources and materials
  - type, number and ratings of components used in the electrotechnology and engineering industries
- updating work records
- using manufacturer specifications, including:
  - selecting relevant electrotechnology parts and components
  - using relevant part and component identification and information.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- information about parts and components, including:
  - alternative parts
  - catalogues
  - computer access

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  - telephone inquiry
- ordering procedures, including customer approval, supplier requirements and job requirements
- part identification and access, including:
  - availability and delivery times
  - manufacturers and manufacturer's supply outlets
  - part codes
  - price, including discounts, goods and services tax (GST)/tax and delivery costs
  - type, number and ratings of typical components used in the electrotechnology and engineering industries
- receiving/dispatching procedures, including supplier requirements, handling and storage and job requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0022 Identify building techniques, methods and materials used in energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify building techniques, methods and materials used in energy sector work activities.

It includes preparing, identifying and confirming building techniques, methods and materials used. It also includes types of fixing devices, segregation requirements, fixing structures, walls and floor structures, lifting techniques and other related building materials.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to identify building techniques, methods and materials	**1.1** Instructions for identifying building techniques, methods and materials used in electrotechnology work are obtained and clarified
	1.2 Work health and safety (WHS)/occupational health and

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			safety (OHS) requirements and workplace procedures are identified and applied
		1.3	Tools, equipment and personal protective equipment (PPE) required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.4	Identification of building techniques, methods and materials is coordinated with relevant person/s
		1.5	Resources and materials needed for work are confirmed, scheduled and obtained in accordance with workplace procedures
		1.6	Schedule for identifying building techniques methods and materials used, including practices for working safely, is confirmed in accordance with instructions and requirements
2	**Identify building techniques, methods and materials**	**2.1**	Hazards are identified, risks assessed and control measures implemented
		2.2	Schedule to identify building techniques, methods and materials used is followed to ensure work is completed in an agreed time to a quality standard and with a minimum of waste
		2.3	Unplanned events are responded to in accordance with workplace procedures and approval of relevant person/s
		2.4	Ongoing checks of work quality are undertaken in accordance with instructions and requirements
3	**Confirm building techniques, methods and materials used**	**3.1**	Final checks are made to confirm building techniques, methods and materials used conform with work instructions and job requirements
		3.2	Work completion is documented and relevant person/s notified in accordance with workplace procedures
		3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
		3.4	Sustainable energy practices are followed and work area is cleaned and made safe

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3.5 Relevant documents and records are updated in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE147A Identify building techniques, methods and materials used in energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0022 Identify building techniques, methods and materials used in energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding work instructions
- obtaining and checking tools and equipment
- following work schedules
- returning tools and surplus resources as required
- updating work records
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- confirming building techniques, methods and materials used
- identifying building techniques, methods and materials.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- energy sector science and materials, including:
  - trade calculations encompassing:
    - mathematical techniques
    - relevant calculations
    - linear measurement, areas, volumes and ratios
  - engineering mechanics encompassing:
    - base physical International System of Units (SI), their applications in engineering calculations in relation to physical quantities and associated formulae
    - mass, velocity, acceleration, force, weight, density and angles
    - energy/work/power
    - moments/torque

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    - centre of gravity
    - mechanical advantage
    - levers
    - pulley blocks
    - efficiency
    - friction
    - vectors
    - resolution of forces
    - forces in strung conductors
    - forces on poles and towers
    - determination of sag
    - pressure/stress
    - elementary fluid mechanics
  - engineering materials encompassing:
    - classification
    - ferrous and non-ferrous metals
    - steels and alloys
    - properties
    - tensile strength
    - temperature and expansion in metals
    - stress and strain
    - ductility
    - applications
    - corrosion
    - galvanic corrosion
    - hardwoods and soft woods
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of

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assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0023 Identify effects of energy on machinery and materials in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify effects of energy on machinery and materials in an energy sector environment.

It includes working safely and applying knowledge of the effects of energy on machinery and/or materials in an electrotechnology environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to identify effects of energy on machinery and/or materials	**1.1** Work instructions for identifying effects of energy on machinery or materials are communicated and applied to ensure clear understanding
	1.2 Work health and safety (WHS)/occupational health and

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			safety (OHS) requirements and workplace procedures are communicated, confirmed and applied
		1.3	Tools, equipment and personal protective equipment (PPE) required for work are identified, scheduled and checked to ensure they work correctly and are safe to use in accordance with workplace procedures
		1.4	Relevant person/s is consulted to ensure effects of energy on machinery and/or materials are identified and coordinated effectively with others involved
		1.5	Resources and materials required for work are confirmed, scheduled and obtained in accordance with workplace procedures
		1.6	Schedule for identifying effects of energy on machinery and/or materials and practices for working safely are confirmed in accordance with work instructions and manufacturer specifications
2	**Identify effects of energy on machinery and/or materials**	**2.1**	WHS/OHS requirements and workplace procedures are followed to eliminate or minimise incidents
		2.2	Schedule for identifying effects of energy on machinery and/or materials work is followed to ensure work is completed in accordance with timeframes, quality standards and minimum of waste
		2.3	Further instructions are sought from relevant person/s in the event of unplanned events and/or conditions
		2.4	Ongoing checks of work quality are undertaken in accordance with work instructions and manufacturer specifications
3	**Check results of the effects of energy on machinery and/or materials**	**3.1**	Final checks are made to ensure the effects of energy on machinery and/or materials, as identified, conforms with work instructions and manufacturer specifications
		3.2	Relevant person/s is notified of completion of the calculations
		3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures

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3.4 Work area is cleaned up, made safe and sustainable energy practices are followed

3.5 Relevant records are updated in accordance with work instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE146A Identify effects of energy on machinery and materials in an energy sector environment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0023 Identify effects of energy on machinery and materials in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding work instruction
- obtaining and checking tools and equipment
- following work schedules
- identifying the effects of energy appropriately
- returning tools and surplus resources as required
- updating work records
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- cleaning work area, making safe and following sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- applied physics concepts, including:
  - motion in two dimensions encompassing:
    - vertical and horizontal components of velocity
    - determination of the vertical component of velocity
    - resolution of velocity into components
    - time of flight, range, effect of air resistance
    - centripetal acceleration, force causing the centripetal acceleration
    - Newton’s law of universal gravitation
    - satellites in circular orbits
    - momentum in two dimensions:
      - vector form of Newton’s second law of motion, Newton’s second law of motion in terms of momentum, law of conservation of momentum

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- electricity and magnetism encompassing:
  - electric fields:
    - Coulomb's law, principle of superposition, electric field, pictorial representation of electric fields, superposition of electric fields, electric field due to one or two charged plates, electric fields and conductors, electric field inside a hollow conductor and electric fields near sharp points
  - the motion of charges particles in electric fields:
    - electric, potential difference, acceleration in a constant electric field, and motion of a charged particle in a constant electric field
  - magnetic fields:
    - magnetic fields and their pictorial representation, and magnetic force on a current-carrying conductor
  - the motion of charges particles in magnetic fields:
    - force on a charged particle in a magnetic field, and motion of a charged particle at right angles to a magnetic field
- light and matter:
  - electromagnetic waves:
    - characteristics of electromagnetic waves, speed, frequency and wavelength
  - the interference of light:
    - coherent wave sources, interference, two-source interference, diffraction, two-slit interference, transmission diffraction gratings and speckle
  - photons:
    - photons, the photoelectric effect and x-rays
  - wave behaviour of particles:
    - wave behaviour of particles, and experimental evidence for wave behaviour of particles
- atoms and nuclei:
  - the structure of the atom:
    - line emission spectrum, energy levels in atoms, spectrum of atomic hydrogen, ionization energy, continuous spectrum, line absorption spectrum, fluorescence and stimulated emission
  - the structure of the nucleus:
    - composition of nuclei, the nucleon force, isotopes, mass defect and binding energy, and conservation laws in nuclear reactions
  - radioactivity:
    - stable and unstable nuclei, types of decay of unstable nuclei, alpha decay, beta minus decay, beta plus decay, half-life and activity
  - nuclear fission and fusion:
    - spontaneous and induced nuclear fission, and chain reaction
- skills:
  - experimental skills:
    - purpose and variables, procedure, observation, presentation and interpretation

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    - investigation design skills:
        - designing and investigation, evaluating and investigation
    - information skills:
        - planning an information search, searching for information and evaluating information
    - communication skills:
        - oral communication, written communication, and evaluation of oral and written communications
- problem-solving techniques
- relevant calculations
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and personal protective equipment (PPE)
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- resources that reflect current industry practices in relation to identifying effects of energy on machinery and materials in an energy sector environment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEECD0024 Implement and monitor energy sector WHS policies and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to implement and monitor energy sector work health and safety (WHS)/occupational health and safety (OHS) policies and procedures.

It includes providing WHS/OHS information to the work group; implementing and monitoring participative arrangements for the management of WHS/OHS; and implementing and monitoring the workplace procedures for identifying hazards, assessing and controlling risks. It also includes implementing and monitoring procedures for dealing with hazardous events, WHS/OHS training, and maintaining WHS/OHS records.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Provide WHS/OHS information to the work group	**1.1** Relevant WHS/OHS legislation and codes of practice are explained to work group

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	1.2	Relevant WHS/OHS workplace policies, procedures and programs are available in a readily accessible manner and explained to work group
	1.3	Identified hazards, risk assessments and risk control measures are identified, supplied and explained to the work group
2 Implement and monitor participative arrangements for management of WHS/OHS	**2.1**	Workplace procedures for consultation of WHS/OHS issues are implemented, monitored and communicated to work group
	2.2	Issues raised through consultation are dealt with and resolved promptly or referred to relevant person/s for resolution in accordance with workplace procedures
	2.3	Outcomes of WHS/OHS consultation issues are communicated to the work group
3 Implement and monitor procedures for identifying hazards, assessing risk and controlling risks	**3.1**	Hazards are identified, risks are assessed and control measures are implemented
	3.2	Risks control measures are implemented and adherence by work group is monitored in accordance with workplace procedures
	3.3	Inadequacies in existing risk control measures are identified in accordance with hierarchy of risk control and reported to relevant person/s
	3.4	Inadequacies in resource allocation for implementation of risk control measures are identified and reported to relevant person/s
4 Implement procedures for dealing with hazardous events	**4.1**	Workplace procedures for responding to hazardous events are implemented to ensure prompt control action is taken
	4.2	Hazardous events are investigated to identify their cause in accordance with workplace procedures
	4.3	Control measures to minimise risks of hazardous events based on the hierarchy of risk control are implemented or referred to relevant person/s

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5	**Implement and monitor procedures for WHS/OHS training**	**5.1** WHS/OHS training needs analysis of work group is performed to identify competency gaps
		5.2 Identified WHS/OHS training gaps are fulfilled by training programs in consultation with relevant person/s
6	**Implement and monitor procedures for maintaining WHS/OHS records**	**6.1** WHS/OHS records for work area are completed in accordance with workplace procedures and relevant legislative requirements
		6.2 Aggregate information from work area WHS/OHS records are used to identify hazards and monitor risk control procedures in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Implementing and monitoring energy sector WHS/OHS policies and procedures must include the following attributes:

- organisation's WHS/OHS obligations
- participative arrangements
- implementation and monitoring safety information to staff
- safety procedures
- safety records maintenance
- training

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE117A Implement and monitor energy sector OHS policies and procedures.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0024 Implement and monitor energy sector WHS policies and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements in the energy sector, including:
  - communicating WHS/OHS issues with relevant person/s, and providing and explaining WHS/OHS information to a work group
  - implementing and monitoring participative arrangements for management of WHS/OHS
  - implementing and monitoring procedures for identifying hazards, and assessing and controlling risks
  - implementing and monitoring workplace procedures for WHS/OHS and maintaining records, including existing hazard register
  - implementing risk control measures using hierarchy of risk control
  - investigating hazardous events to identify causes
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- implementing procedures for dealing with hazardous events
- performing training needs analysis and identifying training gaps
- resolving WHS/OHS issues raised.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- provisions of relevant WHS/OHS legislation
- principles and practice of effective WHS/OHS management
- workplace hazards, range and selection of control measures
- organisational WHS/OHS management systems and policies and procedures needed for legislative compliance
- impact of characteristics and composition of the workforce on WHS/OHS management

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- relevance of WHS/OHS management to other organisational management policies, procedures and systems
- analysis of entire work environment and judge WHS/OHS interventions
- analysis of relevant workplace data
- ability to assess resources needed for risk control
- communication techniques
- relevant WHS/OHS legislation, including:
  - resources needed for risk control
  - hierarchy of risk control measures
  - relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
  - workplace hazards, range and selection of risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures
- training needs analysis.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in an energy sector workplace operational situation where it is appropriate to do so; where this is not appropriate, assessment must occur in a simulated energy sector workplace operational situation that replicates workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits.

It includes preparing to lay, laying wiring/cabling and connecting accessories for ELV circuits. It also includes completing and reporting work activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to lay wiring/cabling and connect accessories for	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied

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ELV circuits

	1.2	Hazards are identified, risks are assessed and control measures are implemented
	1.3	Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from the work supervisor
	1.4	Location of work is obtained from relevant person/s to determine scope of work
	1.5	Advice is sought from relevant person/s to ensure work is coordinated with others
	1.6	Sources of materials required for work are determined in accordance with workplace procedures
	1.7	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Lay wiring/cabling and connect accessories for ELV circuits	**2.1**	WHS/OHS workplace risk control measures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked as isolated in accordance with workplace procedures
	2.3	Wiring and accessories are installed to comply with industry standards and job specifications with sufficient excess to affect terminations
	2.4	Accessories are installed straight and square in the required locations and within acceptable tolerances
	2.5	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and relevant industry standards
	2.6	Cables installed for future service are marked and terminated in compliance with relevant industry standards and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures and approval of immediate supervisor
	2.8	Cable installation and termination is carried out without wasting materials, damaging apparatus, circuits or the

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		surrounding environment using sustainable energy practices
3 Complete and report work activity	**3.1**	WHS/OHS completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Laying wiring/cabling and connecting accessories for ELV power and control cabling systems circuits must include:	• at least one of the following wiring/cabling systems:
	  • unenclosed thermoplastic sheathed (TPS) cable
	  • enclosed thermoplastic insulated (TPI) or sheathed cables
	• at least three of the following wiring/cabling systems:
	  • single cable
	  • flexible cable
	  • flexible cord
	  • shielded cable
	  • ribbon cable
	  • other similar and like cable

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE108A Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- cleaning worksite
- completing and reporting work activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining nature of work activities
- installing cables and accessories to specifications
- laying wiring/cabling and connecting accessories for extra-low voltage (ELV) circuits
- marking cables for future service using workplace procedures
- notifying and documenting completion of work using workplace procedures
- obtaining location of work
- preparing to lay wiring/cabling and connecting accessories for ELV circuits
- reporting safety hazards not previously identified on job safety assessment
- seeking advice from relevant person/s
- selecting appropriate tools, equipment, testing devices, cables and accessories
- sourcing materials required for work activities
- terminating cables, conductors and accessories to manufacturer specifications and requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- cable protection and support method and accessories, including:
  - requirements to protect and support cables adequately - protection against mechanical

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damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable

- cable support and protection devices, accessories and typical applications - metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories
- installation techniques - cable installation equipment and cable drawing and hauling techniques
- basic cable and conductor terminations, including:
  - insulation removal and replacement
  - conductor handling and cable terminations including general aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes (A)
  - application of connecting devices for conductors and terminals
  - continuity through connections and insulation resistance testing
  - stress release on cables/conductors
- environmental and heritage regulation effecting electrotechnology work, including:
  - purpose of environmental and heritage regulation
  - typical issues affecting electrotechnology services and systems
  - meeting requirements
- environmental regulations effecting electrotechnology work
- ELV wiring
- techniques for installing cables in buildings, structures and premises, including:
  - building construction method and construction sequence
  - typical cable routes through buildings, structures and premises
  - building codes affecting the installation of cables in buildings, structures and premises - limitation on penetration structural elements and maintenance of fire protection interiority
  - cable segregation requirements
- technical industry standards, regulations and codes of practice related to ELV work, including:
  - limitation imposed by regulations
  - how to read and apply a standard
- aspects of technical standards that apply to extra-low voltage work types of cables used in the electrotechnology industry and their application, including:
  - structural components of cables and their purpose - conductors and conductor material, insulation, sheathings and servings
  - application of various cables types
  - cable variates - single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables
  - typical characteristics and use of power circuit cables and control circuit cables
- relevant job safety assessments, including risk control measures
- relevant manufacturer specifications
- relevant tools, equipment and testing devices

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0026 Manage risk in electrotechnology activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage risk in electrotechnology activities.

It includes managing risk, environment, resources and financial viability. It also includes identifying risk events, consequences of risk events, evaluating risk, risk management planning and mitigation of risk.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify risks and develop management strategies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of program or project is identified from design brief specifications and/or relevant documentation and

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		in consultation with relevant person/s
	1.3	Potential, perceived and actual risk events are identified, documented and analysed in consultation with risk professionals and/or relevant person/s in accordance with workplace procedures
	1.4	Risk management methods, tools and techniques are used in the analysis, reporting and documenting of identified risk events
	1.5	Risk management techniques are used to analyse risk events, assess options and recommend risk approaches to relevant person/s for approval
	1.6	Risk management processes and workplace procedures are developed for agreement by stakeholders and communicated for ongoing management of risk factors
	1.7	WHS/OHS risk control measure are incorporated in risk management strategies in accordance with workplace procedures and relevant industry standards
	1.8	Condition monitoring of plant, equipment, criteria for repair and/or replacement are incorporated in risk management strategies
2 Implement and monitor risk management strategies	**2.1**	Risk management processes and workplace procedures are incorporated into work and project plans to ensure outcomes are achieved
	2.2	Programs and project plan/s activities are monitored to identify and respond to variations in accordance with risk management processes and workplace procedures
	2.3	Agreed risk responses are implemented and plans modified to reflect changing project objectives in accordance with risk management processes and workplace procedures
3 Evaluate risk management strategies	**3.1**	Project outcomes are reviewed with relevant person/s to determine effectiveness of risk management processes in accordance with workplace procedures
	3.2	Risk issues and recommended improvements are identified, documented and submitted to relevant person/s for approval to be incorporated into ongoing and/or future program or project plans

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE011C Manage risk in electrotechnology activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0026 Manage risk in electrotechnology activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- developing risk management processes and workplace procedures for agreement by stakeholders
- identifying improvements and documenting recommendations
- identifying potential, perceived and actual risk events
- identifying program or project scope
- implementing risk management strategies
- incorporating risk management strategies and condition into monitoring of plant and equipment with criteria for repair and/or replacement
- monitoring to identify and responding to variations
- reviewing project outcomes
- using risk management methods, tools and techniques in analysis and reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant risk management, application and techniques, including:
  - application of risk management tools and techniques
  - implementing risk management
  - need for risk management within the broad project management framework
  - risk management in the context of the project life cycle and other project management functions
  - risk management methodologies, their capabilities, limitations, applicability and outcomes
- uncertainty and the means of measurement

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to managing risk in electrotechnology activities
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0027 Participate in development and follow a personal competency development plan

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in development and follow a personal competency development plan.

It includes the application of skills and knowledge in taking responsibility for one's own competency development; participating in the development of a personal competency development plan, responsibilities and obligations; following activities for developing competency; self-monitoring competency development and meeting learner obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Participate in development of a personal competency development	**1.1** Nature of competency-based training is determined from consultation with relevant person/s

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	plan	
		1.2 Responsibilities/obligations of trainees/learners, employers, trainers and assessors are identified from discussions with relevant person/s
		1.3 Competency development plans are confirmed in consultation with relevant person/s
2	**Follow a personal competency development plan**	**2.1** Competency development plan is followed
		2.2 Opportunities to practise skills and apply knowledge relevant to competencies are followed
		2.3 Assistance is sought from relevant person/s to overcome difficulties in developing skills and applying knowledge in relevant competencies
		2.4 Progress in competency development is self-monitored against the competency development plan and workplace procedures
		2.5 Modifications to the competency development plan are made in consultation with appropriate person/s
		2.6 Obligations are met for periodic and timely reporting of competency development activities

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Competency development plan must include the following:	• applying a competency plan for work activities • competency development self-monitoring • personal competency development plan • periodic reporting of competency activities

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- responsibilities and obligation under the competency development plan
- responsibility for one's own competency development in developing and applying skills and knowledge
- applying a training plan to work activities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE038B Participate in development and follow a personal competency development plan.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0027 Participate in development and follow a personal competency development plan

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- identifying opportunities to develop competency
- following competency development plan including following aspects of the training plan
- participating in a personal competency plan for work activities
- periodic reporting of competency plan activities
- seeking assistance to overcome difficulties in developing competency as needed.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- competency development (training) plans, including:
  - state/territory requirements (Acts/regulations)
  - competency development (training) contracts
  - competency development (training) period
  - purpose of competency development (training) plans
  - process in developing competency development (training) plans
  - parties involved in the competency development (training) plan
- qualification structure, including:
  - scope of work
  - Training Packages - UEE Electrotechnology
  - units of competency
  - structure of qualification
  - off-the-job requirements
  - on-the-job requirements
- responsibilities of parties to the contract, including:

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    - employer responsibilities
    - learner responsibilities
    - RTO responsibilities
    - State/Territory Training Authorities (STA)
- electrotechnology industry career opportunities, including:
    - industry areas
    - qualification levels
    - career paths
- industry customs and practices, including:
    - industry bodies, employer and employee representatives
    - regulatory bodies including licensing/registration, WHS/OHS, industrial relations (IR), training authorities, apprentice/trainee regulation
    - vocational education and training (VET) system, Australian Qualification Framework (AQF) and credentials
- monitoring of workplace evidence, including:
    - workplace exposure and practices and relationship with units of competency
    - methods of collecting workplace evidence
    - monitoring period cycle
    - requirements of workplace evidence
    - actions taken for unsatisfactory progression
    - role of STA
    - apprentice/learner responsibilities
    - employer responsibilities
- RTO policies, including:
    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy, including:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties - apprentice/learner responsibilities
- attendance at the Registered Training organisation (RTO), including:
    - importance of attendance
    - record management of attendance

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  - attendance cards
  - advice to employer of absences
- fire and emergencies at the RTO, including:
  - designated fire and emergency exits
  - procedures in the event of a fire
  - evacuation procedures
  - assembly points
  - importance of attendance
- WHS/OHS at the RTO, including:
  - eye protection
  - foot protection
  - protective clothing
  - personal injuries
  - mobile phones and personal belongings
  - dress regulations
  - rotating machinery
  - designated fire and emergency exits
- entry requirements, including:
  - numeracy requirements
  - literacy requirements
  - RTO support mechanisms
- RTO tour, including:
  - RTO layout
  - building layout
  - tour of building and RTO
- RTO responsibility to receive and monitor workplace activities of the apprentice/learner
- industry requirements for monitoring workplace evidence
- acceptable methods for monitoring and reporting workplace activities
- apprentice/learner responsibility to participate in the reporting of workplace activities
- RTO requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
- employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
- options for appeal or assistance from RTO or STA
- methods of monitoring and reporting competency development activities.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0028 Plan an integrated cabling installation system

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan an integrated cabling installation system, including cable routes for intelligent power and lighting, information and communications, entertainment systems, distributed video and audio, energy management and control, security and safety, digital home health and aged and assisted living.

It includes determining immediate and future cabling needs of an installation, including origin and termination points, planning cable routes, specifying cable types and sizes, fixing/support methods and cable identification systems. It also includes documenting cabling plans based on calculated and/or deemed-to-comply solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

or

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine immediate and future cabling needs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) risk control measures and workplace procedures for carrying out work are followed
	1.2 Supervisor and/or customers are consulted to determine immediate and future cabling services, systems, service items, devices and accessories required
	1.3 Immediate and future location of systems, service items, devices and accessories are determined and written confirmation sought from appropriate person/s in accordance with workplace procedures
	1.4 Safety and other regulatory requirements required for installation compliance are determined and followed in accordance with workplace procedures
2 Plan an integrated cabling system for immediate and future services	**2.1** Types, sizes and capacity of cables required for the various services to be installed are selected to comply with relevant industry technical standards, codes of practice, regulations and workplace procedures
	2.2 Cables are arranged into circuits to ensure safe and functional operation of the services for which they are intended, and comply with technical industry standards, codes of practice, regulations, workplace procedures and budgetary restraints
	2.3 Cabling for protective and functional earthing is determined in accordance with technical industry standards, codes of practice, regulations and workplace procedures
	2.4 Cabling routes are planned and cable support methods for protection against damage are identified to ensure compliance with technical industry standards, codes of practice, regulations and workplace procedures
	2.5 Cable identification labelling scheme is developed to aid installation of services in accordance with workplace procedures

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	2.6	Methods for terminating cables intended for future services are specified in accordance with technical industry standards, codes of practice, regulations and workplace procedures
3 Document the integrated cabling plan	**3.1**	Type, size and capacity of cables selected for the installation of services and supporting justification are documented in accordance with workplace procedures
	3.2	Cable route and cable support methods for protection against damage are documented in accordance with technical industry standards and workplace procedures
	3.3	Cable identification labelling scheme and methods of terminating cables intended for future services are documented in accordance with workplace procedures
	3.4	Acceptance of the integrated cabling plan is sought from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning two integrated cabling installations and must include at least four of the following services:	• intelligent electrical power and lighting • fixed home entertainment systems • integrated energy management system • security and safety system • climate control system • renewable energy systems • water management system • information and communications • digital home health • age and assisted living

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEE121A Plan an integrated cabling installation system.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0028 Plan an integrated cabling installation system

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- communicating effectively with relevant internal and external stakeholders
- completing workplace documentation
- complying with relevant industry technical standards, codes of practice and regulations
- planning integrated cabling installation, including:
  - arranging cables into circuits safely ensuring services function correctly
  - choosing appropriate type and size of cables for immediate and future services
  - dealing with unplanned events in accordance with workplace procedures
  - determining immediate and future cabling needs accurately
  - determining immediate and future location of systems/service items devices and accessories
  - determining immediate and future systems, service items, devices and accessories
  - developing an effective cable identification labelling scheme
  - documenting cabling plan including supporting justification
  - planning cable routes and specifying effective support and protection methods
  - selecting cabling for protective and functional earthing
  - specifying compliant termination methods for cables intended for future use.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- cable identification labelling scheme
- cable sizes, types and capacity
- electrical circuits

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- installation compliance requirements
- methods for terminating cables
- protective and functional earthing techniques
- relevant cabling routes and support methods to protect against damage
- relevant electrical regulations and codes of practice
- relevant industry and technical standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant systems, including:
  - age and assisted living
  - digital home health
  - energy management
  - entertainment
  - information and communications
  - intelligent lighting and power
  - security and safety
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0029 Plan electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan an electrotechnology project.

It includes determining, developing and obtaining approval for an electrotechnology project plan. It also includes establishing budgets, critical path analysis, developing workflow strategies and documenting the plan.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine an electrotechnology project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for relevant work area are identified and applied
	1.2 Techniques for project planning are reviewed and adopted in accordance with workplace policies and procedures

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	1.3	Scope of the project is determined from design brief, specifications and/or other relevant documentation and discussions with appropriate person/s
2 Develop project plan proposal	**2.1**	Plant, material, labour and other cost estimations are sought and obtained from appropriate person/s in accordance with workplace policies and procedures
	2.2	Project budget is determined from plant, material labour and other cost estimations in accordance with workplace policies and procedures
	2.3	Critical path analysis is applied to developing workflow strategies
	2.4	Sources and availability of materials and human resources required for the project are determined in accordance with workplace policies and procedures
	2.5	Risk management strategies are identified, assessed and applied in the project plan
	2.6	Project plan is reviewed against all inputs and adjusted to rectify any anomalies
	2.7	Project plan proposal is documented in accordance with workplace procedures
3 Obtain approval for project plan	**3.1**	Project plan is presented and discussed with appropriate person/s
	3.2	Alterations to the project plan resulting from presentation/discussion are negotiated with appropriate person/s in accordance with workplace policies and procedures
	3.3	Final project plan is documented and approval obtained from appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning an electrotechnology project must include at least one of the following disciplines:	• automation technologies • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology
Electrotechnology project cost must exceed:	• one hundred thousand Australian dollars ($AUD100,000)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE013B Plan electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0029 Plan electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the project requirements accurately
- establishing a project budget
- developing effective workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan successfully
- obtaining approval of the final plan
- dealing with unplanned events
- accessing, interpreting and applying workplace policies and procedures
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- identifying and applying project risk management strategies
- planning electrotechnology projects.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrotechnology project planning and critical path analysis, including:
  - purpose of project planning
  - documents needed to plan a project
  - factors influencing sequence and restraints of project activities
  - critical path analysis encompassing:
    - graphical representation methods
    - methods of representing time/rates
  - purpose of critical path analysis

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  - essential data
  - relational sequence of work activities
  - graphical representation methods
  - methods of representing time/rates
  - monitoring methods
- project risk management strategies
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and facilities currently used in industry
- resources that reflect current industry practices in relation to planning electrotechnology projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare electrotechnology/utilities drawings using manual drafting and computer-aided design (CAD) equipment and software.

It includes preparing, planning and completing electrotechnology/utilities drawings using manual drafting and CAD equipment and software. It also includes preparation and modification of preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures, devices and CAD equipment and software from specifications, layouts, sketches or verbal instructions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0033 Use engineering applications software on personal computers

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan electrotechnology/utilities drawing using manual drafting and CAD equipment and software	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented
	1.3 Extent of work is determined from job specifications and discussions with relevant person/s
	1.4 Relevant person/s is consulted to coordinate work
	1.5 CAD software, tools and equipment required for work are obtained in accordance with workplace procedures
2 Prepare electrotechnology/utilities drawing using manual drafting and CAD equipment and software	**2.1** WHS/OHS risk control measures and procedures for carrying out work are followed
	2.2 Design, detailed drawings and layouts required are determined from job specifications
	2.3 Technical data of system components is interpreted to determine parameters included in detailed drawings
	2.4 Relevant CAD software tools are used to produce detailed drawings based on industry standard protocols
	2.5 Detailed drawings are checked for accuracy and compliance with job specifications
	2.6 Unplanned situations are responded to in accordance with workplace procedures and approval with authorised

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		person/s
3 Complete electrotechnology/utilities drawing using manual drafting and CAD equipment and software	**3.1**	Completed drawings are submitted to relevant person/s and checked for accuracy and compliance with job specifications
	3.2	Modifications are followed and drawings re-submitted for final approval
	3.3	Completed drawings are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software must include:	• architectural and site plan drawings • auxiliary views and revolutions • civil/geographic information systems (GIS) drawing basics • electrotechnology drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards • electrotechnology drawings line work, symbols, lettering and techniques • layouts, assembly and installation drawings, and modifications (version control), and conversion between drawing types • manual drafting methods, techniques, procedures and devices • map drafting • organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

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- organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- pole and structure elevations
- safety precautions when working with CAD equipment
- sketching methods, techniques, procedures and devices encompassing freehand sketching
- sketching techniques
- specifications obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- survey base plan drawings
- technical drawing equipment, including CAD applications, peripherals and devices including CAD software for electrotechnology applications and related commands
- type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology drawings, briefs and/or specifications

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying modifications to original drawings and resubmitting for approval
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- checking drawings for accuracy and compliance with job specifications
- completing electrotechnology/utilities drawings using manual drafting and computer-aided design (CAD) equipment and software
- determining job specifications from designs, drawings and layouts
- filing completed drawings
- obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- planning and preparing electrotechnology/utilities drawings using manual drafting and CAD equipment and software
- preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using CAD equipment and software
- responding to unplanned situations
- submitting completed drawings
- using CAD equipment and related computer commands
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- architectural and site plan drawings for electrotechnology/utilities applications, including:
  - principles, purpose, terms and conventions usage in basic architectural drawings
  - typical scales

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- base plan symbols and labels
- electrotechnology/utilities site plan symbols and labels
- signing and markings site plan symbols and labels
- architectural design and planning principles
- elevation drawings
- architectural symbols and abbreviations usage
- floor plans layout and production
- basic construction terminology and materials
- perspectives and pictorials
- typical wall and building sections with necessary details
- applicable building codes
- as-built floor plan measurement, sketching and drafting
- usage of schedules in freehand architectural style lettering
- styles of architecture
- fundamentals and design function in residential design
- site plans production
- foundation plan production

- AutoCAD basics for electrotechnology utilities applications, including:
  - operating system fundamentals encompassing principals, concepts and applications of CAD hardware; terms, conventions and codes related to CAD hardware; CAD hardware type and variation; system specifications interpretation and usage; input/output (I/O) devices identification; computer components installation and configuration arrangements and applications
  - CAD filing and naming conventions
  - opening program, closing and saving drawings
  - basic drafting commands encompassing line, circle, spline and rectangle
  - basic modification commands encompassing erasing, copy, mirror, block, trim and extend
  - layout and plotting
  - design centre encompassing electrical symbols and electronic symbols
  - AutoCAD and lists
  - components and symbols in CAD
  - mass storage and file compression
  - network operating systems, protocols, and cabling systems
  - researching hardware and software
  - installation and configuration of operating systems
  - plotting solutions
  - security issues
  - system maintenance
  - user interface
  - object creation and modification

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  - editing
  - layers
  - properties
  - paper space and model space concepts
  - dimensioning and dimensioning variables
  - blocks
  - attributes
  - three-dimensional construction
  - solid modelling and scripts
  - library construction
  - database manipulation
  - data extraction
  - circuit simulation
  - wiring symbols - motor and generator; alternating current (a.c.) and direct current (d.c.) ; wiring junctions; grounds; distinguishing power and control conductors; normally open and normally closed contacts; series and shunt coils; circuit protection devices - overload relay w/thermal element; fuse and circuit breakers; push button - disconnect switches; momentary contact; maintained contact; meters; resistors; transformers - power, current, potential and auto-transformers
- auxiliary views and revolutions, including:
  - principles, concepts and purpose of auxiliary views and revolutions
  - terms, conventions and codes related to auxiliary views and revolutions
  - rules of revolutions
  - types and usage techniques of auxiliary views, auxiliary reference planes and revolutions
  - techniques and applications in finding the true size of an oblique surface
  - secondary auxiliary view drawing techniques and applications
  - applications of revolutions
  - usage of the axis of revolution to draw the true shape of an oblique view
- civil/geographic information systems (GIS) drawings fundamentals, including:
  - principles, terms and conventions usage in civil GIS drawings
  - land surveying techniques (e.g. property line, corners, symbols, coordinates, base line and typical sections)
  - GIS and global positioning systems (GPS) uses and applications
  - land survey plot production from a written description
  - manual and computer methods calculation of area
  - contour plans
  - profile drawings
- drawing, numbering, file names and digital file storage, including:
  - drawing series and version control
  - drawing sheet numbering
  - drawing file names

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  - drawing storage
  - drawing file
- electrotechnology/utilities drafting fundamentals, including:
  - principles, concepts and purpose of electrotechnology/utilities drafting
  - terms, conventions and codes related to electrotechnology/utilities drafting
  - rules and symbols used in electrotechnology/utilities drafting
  - types and usage techniques of electrotechnology/utilities drawings
  - techniques and applications for creating graphic symbols charts
  - techniques and applications in composing block diagram drawings
- electrotechnology/utilities drawings and diagrams
- electrotechnology/utilities drawings line work, symbols, lettering and techniques production to Australian/New Zealand industry standards, including:
  - principles of correct drafting technique
  - principles, concepts and purpose of electrotechnology/utilities drawings
  - terms, symbols (including sectional symbols), conventions and codes related to electrotechnology/utilities drawings
  - rules for drafting electrotechnology/utilities drawings
  - types and usage techniques of electrotechnology/utilities drawings
  - relationship between components and symbols used in drafting applications
  - techniques and applications for production of electrotechnology/utilities drawings
- map drafting, including:
  - types and usage techniques of map drafting and illustrated maps
  - techniques and applications of plat surveys and set plans
  - techniques and applications of contour maps using profile coordinates
  - map reading techniques and applications
  - map drawing techniques and applications
- pole and structure elevations, including:
  - elevation sheet layout
  - elevation labelling
  - concrete bases
  - luminaire pole elevations
  - signal pole elevations
  - service pole elevations
  - sign pole elevations
  - sign bridge and cantilever elevations
  - breakaway sign structures
  - wood post/sign structures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- risk control measures
- sketching techniques for electrotechnology/utilities applications, including:
  - lines and letters
  - shapes
  - solids
  - axonometric views
  - building sketch
  - isometric views
  - object sketch
  - perspective: building interior perspective sketch
  - detail labelled sketch
- standard drawing sheets and drawing sheet layout, including:
  - standard drawing sheet borders
  - standard drawing sheet scale
  - standard drawing sheet editing - routine
  - standard drawing sheet editing - title block
  - standard drawing sheet editing - revision blocks
  - drawing sheet layout for small electrotechnology/utilities projects
  - drawing sheet layout for large electrotechnology/utilities projects
  - drawing sheet layout for signing and markings projects
  - key plan sheets
  - drawing layers
  - line types
- survey base plan drawings, including:
  - survey base plan scale
  - survey base plan
  - survey base plan contents
  - model space and paper space
  - external reference (xref) drawings
  - viewports.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare engineering drawings using manual drafting and computer-aided design (CAD) for electrotechnology/utilities applications.

It includes planning and producing electrotechnology/utilities engineering drawings. It also includes completing, reporting electrotechnology/utilities engineering drawings as well as using manual drafting methods, CAD equipment and software from specifications, layouts, sketches or verbal instructions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECS0033 Use engineering applications software on personal computers

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Plan electrotechnology/utilities engineering drawing**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
		1.2 Hazards are identified, risks are assessed and control measures are implemented
		1.3 Extent of work is determined from job specifications, discussions with relevant person/s, sketches, preliminary layouts and/or field investigations
		1.4 Relevant person/s is consulted to coordinate work
		1.5 CAD software, tools and equipment required for work are obtained in accordance with workplace procedures
2	**Produce electrotechnology/utilities engineering drawing**	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
		2.2 Design, drawings and layouts required are determined from job specifications
		2.3 Technical data of system components is interpreted to determine parameters included in drawings
		2.4 Relevant CAD software tools are used to produce drawings in accordance with workplace procedures
		2.5 Drawings are checked for accuracy and compliance with job specifications
		2.6 Unplanned situations are responded to in accordance with workplace procedures and approval with authorised person/s
3	**Complete and report electrotechnology/utilities engineering drawing**	**3.1** Completed drawings are submitted to relevant person/s and checked for accuracy and compliance with job specifications
		3.2 Modifications are followed and drawings re-submitted for final approval
		3.3 Completed drawings are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Preparation of electrotechnology/utilities engineering drawing using manual drafting and CAD applications must include:	• auxiliary views • care and use of equipment • descriptive geometry/revolutions • development layouts • dimensioning/size description and tolerancing • drawings, including component drawings for fabrication, assembly and sub-assembly drawings, installation drawings, fault location aids such as flow diagrams and modifications (version control), and conversion between drawing types • drawing reproductions • engineering drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards for electrotechnology/utilities applications • fabrication drawings • geometric construction • graphs and charts • ink overlay drawings production • layout drawings • manual drafting methods, techniques, procedures and devices • maps and profiles design • mechanical, fabrication and fluid power • multi-view orthographic projections • organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option • organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and

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systems
- organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with worksite procedures
- pattern development
- pictorial drawings
- pipe/plumbing drawings
- safety precautions when working with CAD equipment
- sectional views/conventions
- sketching methods, techniques, procedures and devices including freehand sketching
- specifications obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- structural steel and sheet metal drawings
- technical drawing equipment, including CAD applications, peripherals and devices
- technical illustrations
- thread representations
- type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/utilities related engineering drawings, briefs and/or specifications
- working drawings

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying modifications to original drawings and resubmitting for approval
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- checking drawings for accuracy and compliance with job specifications
- completing and reporting electrotechnology/utilities engineering drawings
- determining job specifications from designs, drawings and layouts
- filing completed drawings
- obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- planning and producing electrotechnology/utilities engineering drawings
- preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using computer-aided design (CAD) equipment and software
- responding to unplanned situations
- submitting completed drawings
- using CAD equipment and related computer commands
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- drawing fundamentals, including:
  - principles, purpose and classification of drawings
  - basic drawing terms and conventions
  - symbols, codes and abbreviations used in drafting drawings
  - tools and equipment used in drafting drawings

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- drawing forms; sheet size and format, metric, imperial and copy fold information
- drawing routines, signatures, approvals, dates, numbers and numbering systems, design considerations/specifications, materials or component specifications, lists, titles, proprietary information, fasteners, representations, notes, charts and graphs, modifications and revision conventions
- fundamentals of drafting documentation, including contents, version control, indexing and product identification (e.g. logo, trademark and software warning plates)
- delineation: line conventions and lettering, multi- and sectional view drawings, pictorial drawings, types and application of engineering drawings, conventional representations, microfilming, descriptive geometry and revolutions
- measurements: types, forms, units, symbols, reading and transfer
- sketching techniques (e.g. freehand lettering)
- basic drafting skills (e.g. drafting by hand, working with triangles, and working with a T square)
- basic drawing layout (e.g. borders and information blocks)
- line types and weights
- geometric construction principles
- use of drawing instruments and equipment to produce basic technical drawings
- drawings instruments and media usage
- usage of reproducible drawings with mechanical pencils

- lettering, including:
  - principles, concepts and applications of lettering
  - terms, conventions and codes related to lettering
  - construction of vertical or inclined, single-stroke gothic lettering, numerals and fractions, including proper spacing and guidelines
  - proper lettering instruments selection
  - usage of lettering techniques for notes and titles on drawings
  - text style, text composition, and text placement selection and application
- sketching, including:
  - principals, practices and rules for sketching in relation to proportion, placement of the views, and drawing medium
  - concepts and applications of sketching
  - terms, conventions and codes related to sketching
  - sketches used in industry
  - usage of sketching aids for creative communication
  - sketching types and their applications
  - line techniques in sketching simple objects
  - estimation and proportion techniques usage
  - views selection for requisite applications
  - blocking technique for size, shape and details
  - surface shading techniques

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- geometric construction, including:
  - principles, concepts and applications of geometric construction
  - terms, conventions and shapes related to geometric construction
  - drawing techniques of lines, angles, circles, arcs, tangents and polygons
  - geometric construction to single-view and multi-view drawings
  - graphic geometric controls
  - intermediate CAD commands
  - plotting and printing equipment set-up and configuration
- multi-view orthographic projections and Australian/New Zealand and industry standards, including:
  - principals of multi-view orthographic projections
  - terms, conventions and codes related to multi-view drawings
  - applications and use of orthographic projections/drawings (e.g. 3rd angle)
  - types and usage techniques of orthographic projection
  - sketching techniques related to orthographic views
  - rules for orthographic projection
  - working drawing problems and specifications
  - views visualisation and selection
  - 1st and 3rd angle projection drawings
  - lines, lettering, and drawing medium types
  - fractional, decimal, and metric equations solutions
  - concepts of units of measurement usage related to multi-view orthographic projections
  - sectional and/or auxiliary views uses, identification and analysis
  - rules for sections and auxiliary views
  - geometric figures visualisation and drawing in two dimensions
  - geometric figures classification and comparison
  - circle properties and relationships, and circle problem solving
  - drawing from a view of a model (e.g. orthographic projection)
- auxiliary views, including:
  - principles, terms and conventions usage in auxiliary views
  - use and application of auxiliary views
  - primary auxiliary view construction
  - secondary auxiliary view construction
- descriptive geometry/revolutions, including:
  - principles, terms and conventions usage in descriptive geometry/revolutions
  - graphic solutions of points, lines and planes
  - graphic solutions of intersections (e.g. lines, planes and solids)
  - true length of lines, bearing and slope of lines
  - graphic solutions of solids
  - drawings construction using the revolution method

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- sectional views/conventions, including:
  - principles, terms, symbols and conventions of sectional views
  - use and application of sectional views
  - drawing standard sectional views
  - use of conventional breaks
  - symbols used to represent different materials
  - use of cutting plans
- pictorial drawings introduction and production to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of pictorial drawings
  - terms, symbols, conventions and codes usage in pictorial drawings
  - types and usage techniques of pictorial drawings
  - line of sight application
  - isometric view usage
  - pictorial drawing types, usage and selection
  - pictorial drawings sketching
  - pictorial working drawing problems and specifications
  - axonometric, oblique and perspective drawings construction
  - calculations in projection plane angles
  - standards for drawing pictorial drawings
  - application of properties and relationships of triangles to solve geometric shapes
  - conversion of an angular dimension of an orthographic to a linear dimension in a pictorial drawing
  - drawing techniques of pictorial representations
- dimensioning/size description and tolerancing as applied to drafting, including:
  - principles, terms, symbols and conventions used in dimensioning and tolerancing
  - terms, conventions and codes related to dimensioning
  - dimensioning drawing construction using Australian/New Zealand Standards
  - types and usage techniques of dimensioning
  - application of dimensioning to object drawings
  - geometric dimensioning and tolerancing
  - lines used in dimension drawings construction
  - dimensioning practices applications
  - dual dimensioning
  - tolerancing applications
  - dimensioning verification requirements
  - formulas for positional tolerancing
  - form, orientation, profile and runout
- development layouts of various shaped objects to Australian/New Zealand and industry standards, including:

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  - principals and concepts of development layouts of various shaped objects
  - terms, conventions and codes related to surface developments
  - surface development uses in Australian/New Zealand and industry standards
  - basic three-dimensional geometric shapes visualisation in a two-dimensional plane
  - cut out and construct models for checking accuracy
  - rules to surface developments to produce stretch-outs
- layout drawings production to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of layout drawings
  - terms, conventions and codes related to layout drawings
  - layout drawings types and differences
  - rules for layout drawings
  - concepts of units of measurement usage related to layout drawings
- technical illustrations drawing to Australian/New Zealand and industry standards, including:
  - principals, concepts and purpose of technical illustrations
  - terms, conventions, symbols and codes related to technical illustrations
  - types and usage techniques of illustrations
  - rules for technical illustration application
  - techniques and applications for creating illustrations
  - illustration types usage and selection
  - illustration working drawing problems and specifications
  - techniques and applications in the use of drawing instruments to prepare illustrations
  - surface shading purpose and types, selection and analysis
  - techniques and applications in airbrush renderings to detailed illustrations
  - techniques and applications of CAD practices to technical illustrations
  - techniques and applications of line-shaded illustrations
  - concepts of units of measurement usage related to illustrations
  - solutions for illustrations using fractional, metric and decimal equations
- graphs and charts production to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of basic graphs, charts and diagrams production
  - terms, conventions and codes related to basic graphs, charts and diagrams production
  - graphs, charts and diagrams production types, usage and variations
  - data configuration for graphic representation
  - graph type selection per specifications and data
  - basic graphic charts and diagrams interpretation
  - charts and diagrams construction
- thread representations, including:
  - principles, concepts and applications of threaded fasteners
  - terms, conventions and codes related to threaded fasteners
  - types and usage techniques of threaded fasteners

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- drawing of threads using simplified and schematic types of thread representation
- working drawings, including:
  - principles, concepts and applications of working drawings
  - terms, conventions and codes related to working drawings
  - types and usage techniques of working drawings
  - title block, bill of materials and schedules used in working drawings
  - working drawing production requirements
- care and use of equipment, including:
  - principles, concepts and applications of various drafting instruments, equipment and materials
  - types and usage techniques of drafting instruments, equipment and materials
  - drawing materials selection for specific types of drafting projects
  - drawing instruments usage as a means of technical drawings preparation for accuracy and readability
  - CAD station components identification
  - CAD set-up requirements to complete a basic drafting problem
- CAD basics, including:
  - principles, terms, symbols and conventions usage in CAD
  - concepts and applications of CAD and related application commands
  - types of CAD hardware
  - CAD standards, including file presentation; layering standards; sorting graphic data, including data groups, principal data and supporting data; layering naming convention;, colour assignment standard (layer colours and pen weights); provision for creation of new layers; blocks standards - real blocks object, common block objects, symbol objects, block library and block naming; text style standards - text styles naming, text height; dimension styles standards - dimension style naming; line-type (LT) standards; title blocks and graphic scales - title block set-up, information title blocks, drawing scales; systems of measurement and preferred scales - drawing scales
  - disk operating system (DOS) and windows application definitions
  - techniques and practices in the application of program assist and editing commands
  - view and display commands (e.g. zooming and panning)
  - query commands to extract drawing data
  - techniques and practices in the application of changes to text styles, text entering and editing
  - existing drawing modifications
  - working with multiple drawings using cut and paste, and so on
  - components and symbol libraries creation, editing and retrieval
  - plotting drawings to the proper scale
  - scaling techniques applications
  - layering techniques applications
  - LT scale usage

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- drawing techniques application
- drawing setups to applicable standards (e.g. settings, layers, line types and widths)
- two-dimensional drawing creation
- cartesian, polar, absolute, and relative coordinates usage in drawing lines and shapes
- techniques and practices in the application of geometric construction
- techniques and practices in the application of text to a drawing
- techniques and practices in altering font options
- techniques and practices in the application of laying out, drawing and completing orthographic drawings
- techniques and practices in the application of drawing objects in isometric using isometric drawing commands
- techniques and practices in the application of completing primary auxiliary drawings on CAD equipment
- techniques and practices in the application of CAD to draw screw threads
- techniques and practices in the application of making, setting and using layers and blocks

- basic production fabrication drawings to Australian/New Zealand and industry standards, including:
  - principles, terms, symbols, codes and conventions usage in production of fabrication drawings
  - types and usage techniques of detailed and assembly drawings
  - detailing: including principals, concepts and applications of detailing; terms, conventions and codes related to detailing; detailing types, application and selection; different fabrication processes and identification of machine parts; rules for drawing machine part details; concepts of units of measurement usage related to detailing; application of properties and relationships of triangles and circles to solve geometric shapes related to detailing
  - assembly drawings: including principals, concepts and applications of assembly drawings; terms, conventions and codes related to assembly drawings; different assembly processes and identification of machine part assemblies; rules for drawing assembly drawings; concepts of units of measurement usage related to assembly drawings; application of properties and relationships of triangles and circles to solve geometric shapes related to assembly drawings
  - machine assembly drawing production
  - detail drawings standard machine fits applications
  - drawings for welded component parts
  - parts list (e.g. balloons) development
  - file and/or drawing for CAD/computer-aided manufacturing (CAM) applications
  - gears drawings
  - CAM drawings
  - threads and fasteners (e.g. bolts, pins and keys) use and applications
  - drawings for metal bending and fabricating
  - standard fits, finishes, and tolerances to a machine drawing application

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  - manufacturing processes (e.g. machine, metal forming and computer numerically controlled (CNC))
- pattern development, including:
  - principles, concepts and purpose of pattern development
  - terms, conventions and codes related to pattern development
  - types and usage techniques of pattern development and related drawings
  - application of pattern development and intersection techniques
  - intersections of geometric surfaces development techniques and applications
  - flat surfaces development techniques and applications
  - construct of objects from the intersection
- maps and profiles design and production to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of maps and profiles design and production
  - terms, conventions and codes related to maps and profiles design and production
  - maps and profiles design and production types and uses
  - rules for cartography
  - components selection and transit usage
  - symbols usage and applications for topography
  - application of properties and relationships of triangles to solve geometric problems, trigonometric relations to solve right triangles, law of sines and cosines to solve triangles
- pipe/plumbing drawing basics, including:
  - principles, purpose, terms and conventions usage in pipe/plumbing drawings
  - applicable codes, symbols and abbreviations
  - piping symbols, fittings, fixtures and valves
  - types of piping systems and usage techniques in pipe drawings
  - principles of pneumatics and hydraulics
  - pneumatics and hydraulic schematics production
  - plumbing schematics production
  - techniques and applications in creating drawings of piping symbols and systems
- structural steel, welding and sheet metal drawing basics, including:
  - principles, terms and conventions usage in structural steel, welding and sheet metal drawings
  - applicable codes (e.g. WHS/OHS, Standards Australia/New Zealand, building codes and regulations, related standards and codes)
  - classification of major structural and welding components
  - rules and symbols used in structural and welding drawings
  - structural steel shapes
  - steel-framing materials
  - detail and assembly drawings (including beam connections) with bill of materials
  - steel frame plan drawings production

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  - types and usage techniques of structural and welding drawings
  - techniques and applications in creating structural drawings using measuring, labelling, and symbol procedures
  - techniques and applications used in drafting the processes for joining metal and standard symbols for welding
  - techniques and applications in creating welding drawings complete with weld symbols
  - sheet metal layout methods and procedures
  - representative sheet metal drawings
  - sheet metal drawings for CAD/CAM applications
- ink overlay drawings produced to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of ink overlay drawings production
  - terms, conventions and codes related to ink production
  - drawing specifications identification and analysis
  - rapid graph equipment usage procedures
- drawings reproductions to Australian/New Zealand and industry standards, including:
  - principals, concepts and applications of drawing reproductions
  - terms, conventions and codes related to processes related to drawing reproductions
  - rules for reproducing drawings
  - various machines usage and selection in the reproduction process
- CAD software and functions
- drawing fundamentals
- electrotechnology/utilities engineering drawings and diagrams
- relevant risk mitigation processes including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sketching techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce detailed electrotechnology/utilities drawings using computer-aided design (CAD) equipment and software.

It includes planning, producing and completing detailed electrotechnology/utilities drawings. It also includes modification and maintenance of detailed electrotechnology/utilities drawings and diagrams using CAD equipment and software from specifications, layouts, sketches or verbal instructions

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0033 Use engineering applications software on personal computers

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan detailed electrotechnology/utilities drawing	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented
	1.3 Extent of work is determined from job specifications and discussions with relevant person/s
	1.4 Relevant person/s is consulted to coordinate work
	1.5 CAD software, tools and equipment for work are obtained in accordance with workplace procedures
2 Produce detailed electrotechnology/utilities drawing	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Design, detailed drawings and layouts required are determined from job specifications
	2.3 Technical data of system components is interpreted to determine parameters included in detailed drawings
	2.4 Relevant CAD software tools are used to produce detailed drawings based on standard protocols
	2.5 Detailed drawings are checked for accuracy and compliance with job specifications
	2.6 Unplanned situations are responded to in accordance with workplace procedures and approval with authorised person/s
3 Complete detailed electrotechnology/utilities drawing	**3.1** Completed detailed drawings are submitted to relevant person/s and checked for accuracy and compliance with job specifications

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3.2 Modifications are followed and detailed drawings re-submitted for final approval

3.3 Completed detailed drawings are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Producing detailed electrotechnology/utilities drawings using CAD equipment and software must include:

- detailed circuit and wiring diagrams/schedules, block diagrams, schematics, printed circuit board (PCB) layouts, assembly and installation drawings, modification drawings, and conversion between drawing types
- electrotechnology/utilities specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief
- master sketches methods, techniques, procedures and devices including freehand sketching
- type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities engineering drawings, briefs and/or specifications
- specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- materials and equipment used in electrotechnology/ utilities engineering applications by selecting the correct type, form and size of materials and equipment from information, abbreviations and

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symbols supplied on detailed electrotechnology/ utilities engineering drawings, briefs and/or specifications

- advanced CAD equipment commands and drawing techniques and processes
- CAD application programs and advanced tools
- utility programs disk and file management
- filing systems management including entering/retrieving technical information from computer-related database programs for the production, modification and/or maintenance of detailed electrotechnology/ utilities drawings
- safety precautions when working with CAD equipment
- detailed working drawings
- drafting/modelling electrotechnology/ utilities
- detailed electrotechnology/utilities drawings including a representative array of relevant 2-D and 3-D CAD drawings
- single and multi-part components and detailed electrotechnology utilities assemblies for fabrication, assembly, installation and/or modification of products including dimensions including dimensions; fabrication, assembly, installation and/or modification notes, circuit/wiring layouts/schedules and parts lists from specified dimensions, associated tolerances and design specifications.
- architectural drawings for electrotechnology/utilities applications
- organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- organisational procedures for collaborating

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with the client, key stakeholders and other staff in the selection of the preferred option

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE192A Produce detailed electrotechnology/utilities drawings using computer aided design equipment and software

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying modifications to original drawings and re-submitting for approval
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements including implementing risk control measures
- checking drawings for accuracy and compliance with job specifications
- determining job specifications from designs, drawings and layouts
- filing completed drawings
- preparing, producing and completing detailed electrotechnology/utilities drawings
- producing detailed electrotechnology/utilities drawings using computer-aided design (CAD) equipment and software
- responding to unplanned situations
- submitting completed drawings
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- detailed working drawings, including:
  - definition of detailed working drawings
  - usage and types of detailed working drawings
  - composition and layout of detailed working drawings
  - preparation of detailed working drawings
- advanced (master) sketching techniques, including:
  - lines and letters
  - shapes

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  - solids
  - axonometric views
  - building sketch
  - isometric views
  - object sketch
  - perspective: building interior perspective sketch
  - detail labelled sketch
  - complex surfaces with tangent and curvature continuities
  - surfaces manipulation using editing tools
  - surfaces analysis for quality and desired characteristics
- drafting/modelling electrotechnology/utilities, including:
  - standard documentation practices for block diagrams
  - wiring diagrams
  - circuit schematics
  - control circuits
  - creating one-line diagrams
  - standard printed circuit board (PCB) layouts
  - printing wiring assemblies
  - art masters
- electrotechnology/utilities related drawings, including:
  - charts and graphs, including alternating current (a.c.), frequency, electromagnetisms, signals and transmission
  - measuring devices and gauges
  - power sources, transformers, alternators, motors and related applications
  - earthing
  - conduits, boxes and fittings, harnesses, cable trays and ducts
  - conductor terminations, splices, installations and wiring schedules
  - busways
  - electric services installations
  - protection devices -over current and voltage, circuit breakers and fuses
  - switches, contactors and relays
  - control systems and devices
  - high voltage (HV) devices and apparatus
  - cabinet and panel layouts
  - plot and floor plans
  - electric lighting
  - analogue and digital systems, circuits, electronic components and devices - connections; resistors; capacitors; magnetic devices; piezoelectric devices; crystals and resonators; transducers, sensors and detectors; solid state components and semiconductors; display technologies filament; light-emitting diode (LED); liquid crystal display (LCD), discharge devices; thermionic valves; vacuum tubes; assemblies and modules;

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prototyping aids and mechanical accessories
    - data networks, communication and telecommunications equipment and devices
    - pneumatic and hydraulic circuits, including related piping ware and components
- AutoCAD functional for electrotechnology/utilities, including:
    - user coordinates systems
    - right-hand rule
    - 2-D geometry extrusion
    - 2-D views from 3-D models and visa-versa
    - user coordinate systems creation
    - 3-D wireframe geometry creation
    - 3-D faces on wireframe geometry placement
    - 3-D geometry viewing
    - surfaces construction
    - working drawings generation
    - drawing set up using model space and paper space, including printing and plotting
    - plotting
    - rendering
    - 3-D models construction
    - 3-D surface models construction
    - 3-D models display from different vantage points
    - orthographic drawings constructed from 3-D models
    - rendered images creation
    - solid modelling construction using Boolean operations
    - scripts writing and tool button macros application
    - organisation of writing scripts and tool button macros commands
    - advanced drawing, editing, and configuration procedures application
    - basic user-level system customisation
    - design environment
    - basic workflow
- AutoCAD project basics, including:
    - project manager
    - project drawing list
    - projects progression/stages
    - projects copy and activation
- AutoCAD schematic wiring, editing, components and reporting, including:
    - wiring and ladders
    - wire types and wire numbers
    - source and destination signal arrows
    - multiple phase and multi wire circuits

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  - circuits
  - connectors and point-2-point wiring
  - basic editing utilities
  - miscellaneous tools
  - data tools
  - re-sequence and re-tag drawings
  - using the auditing tools
  - schematic symbol annotation
  - inserting schematic symbols
  - swapping and updating blocks
  - inserting schematic components from lists
  - generating schematic reports
- AutoCAD panel layouts, including:
  - creating panel layouts from schematic lists
  - din rail utility usage
  - panel footprints
  - terminal strip editor usage
  - panel layout annotation and reports
- AutoCAD programmable logic controller (PLC) modules, including:
  - PLC input/output (I/O) modules
  - PLC modules builder
  - PLC database file editor, including insert and edit in parametric PLC modules, non-parametric PLC modules and stand-alone PLC I/O points
  - PLC I/O address-based tagging
  - spreadsheet to PLC I/O utility
- AutoCAD detailed settings and configurations advanced commands, including:
  - drawing properties
  - project properties
  - creating wire types
  - reference files usage
  - creating drawing templates
  - installation and search paths
- AutoCAD detailed customised components and customised detailed data, including:
  - schematic symbols
  - icon menu system
  - panel footprints
  - part catalogue databases usage
  - pin list database editor
  - title block update and attributes
  - terminal properties editor

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  - reference files usage
- AutoCAD advanced auditing tools, automation tools and integration, including:
  - auditing tools
  - troubleshooting tools
  - updating schematics from spreadsheets
  - generating automatic reports
  - AutoCAD integration
  - din rail editor
  - footprint with wire annotation
  - conduit tools
  - cables management
- AutoCAD database management and productivity tools, including:
  - title block attributes automation tools update
  - schematics update spreadsheets
  - adding wire data to footprints
  - managing cables
  - using the circuit builder
  - working with peer-to-peer
- drawings production using CAD application programs, including:
  - principals, concepts and applications of drawings production using CAD application programs
  - terms, conventions and codes related to drawings production using CAD application programs
  - drawing production types using CAD application programs
  - CAD advanced commands identification and application for drawings
  - CAD advanced commands identification and application for editing drawings
  - CAD advanced commands identification and application for hardcopy drawings
  - techniques and applications in producing detailed architectural drawings of a floor plan, elevation, and exterior wall section for a residential structure related to electrotechnology/ utilities applications
- T15 utility programs disk and file management, including:
  - principals, concepts and applications of disk and file management of utility programs
  - terms, conventions and codes related to disk and file management of utility programs
  - disk operating system commands identification and usage
  - utility commands identification and usage
  - commands for word processing identification and usage
- CAD information technology
- detailed electrotechnology/utilities drawings
- relevant manufacturer specifications
- relevant risk mitigation processes include risk control measures

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0033 Produce products for carrying out energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce products for carrying out energy sector work activities.

It includes preparing and producing products for carrying out energy sector work, and checking quality of the products produced.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to produce products	**1.1** Work instructions for preparing work activities of the product are obtain and confirmed
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are

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		communicated, confirmed and applied to the carrying out of the energy sector work activities
	1.3	Tools, equipment and personal protective equipment (PPE) for work are identified, checked and are safe to use in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure work is coordinated effectively with others
	1.5	Resources and materials required for work activities and energy sector produced products are confirmed, scheduled and obtained in accordance with workplace procedures
	1.6	Schedule of work and safe work practices are confirmed in accordance with work instructions and workplace procedures
2 Produce energy sector products	**2.1**	WHS/OHS policies and workplace procedures for safe work practices are followed to eliminate or minimise incidents
	2.2	Schedule of work is followed to ensure products are completed in accordance with agreed timelines, required quality standard and with a minimum of waste
	2.3	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.4	Quality checks of work activities are undertaken in accordance with work instructions and workplace procedures
3 Check results of products produced	**3.1**	Checks are made to ensure the completed product is in accordance with work instructions
	3.2	Relevant person/s is notified of work activity completion
	3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned, made safe and sustainable energy practices are followed
	3.5	Records are updated in accordance with work

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instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE142A Produce products for carrying out energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0033 Produce products for carrying out energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying energy sector industry standards
- applying quality, workplace procedures and instructions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements: including using risk control measures
- applying sustainable energy practices
- completing schedule of work
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- preparing and producing energy sector products, including:
  - obtaining and checking tools and equipment
  - updating work records
  - using and returning tools, equipment, personal protective equipment (PPE), surplus resources and materials
  - using relevant hand, fixed and portable tools.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- basic technical drawing conventions and symbols
- freehand technical sketching techniques
- hand tools for cutting, shaping, drilling, threading, tapping, and finishing metallic and non-metallic components, including:
  - types of tools and their purpose
  - techniques for the correct and safe use of these tools
  - hazards associated with their use
  - care and maintenance of hand tools

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- tools for measuring and marking out, including:
  - types of tools and their purpose
  - techniques for the correct and safe use of these tools
  - hazards associated with their use
  - care and maintenance of hand tools
- tools for dismantling and assembling electrical and electronic components, including:
  - types of tools and their purpose
  - techniques for the correct and safe use of these tools
  - hazards associated with their use
  - care and maintenance of hand tools
- fixed power tools for cutting, shaping, drilling, and finishing metallic and non-metallic components, including:
  - types of tools and their purpose
  - techniques for the correct and safe use of these tools
  - hazards associated with their use
  - care and maintenance of fixed power tools
- portable power tools for cutting, shaping, drilling, and structural components including:
  - types of tools and their purpose
  - techniques for the correct and safe use of these tools
  - hazards associated with their use
  - care and maintenance of fixed power tools
  - requirements for use on construction sites
- purpose of sequencing dismantling and assembling
- importance of marking/labelling and storing parts
- techniques for dismantling and assembling close fitting parts
- use of gasket and seals
- hazards associated with welding activities and equipment
- welding processes and industry applications
- thermal cutting techniques
- manual metal arc welding processes
- problem-solving techniques
- relevant energy sector industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant quality workplace procedures
- relevant sustainable energy practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions, including quality workplace procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0034 Produce routine tools/devices for carrying out energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce tools and devices required to carry out energy sector work activities.

It includes identifying and carrying out work activities in the energy sector.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify energy sector work activity	**1.1** Work instructions for preparing work activities are obtained and confirmed
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are communicated, confirmed and applied

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	1.3	Tools, equipment and personal protective equipment (PPE) for work are identified, checked and are safe to use in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure work is coordinated effectively with others
	1.5	Resources and materials required for work are confirmed, scheduled and obtained in accordance with workplace procedures
	1.6	Schedule of work and safe work practices are confirmed in accordance with work instructions and workplace procedures
2 Produce tools/devices	**2.1**	WHS/OHS policies and workplace procedures for safe work practices are followed to eliminate or minimise incidents
	2.2	Schedule of work is followed to ensure work is completed in agreed timelines, to required quality standard and with a minimum of waste
	2.3	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.4	Regular quality checks of work are undertaken in accordance with work instructions and requirements
3 Complete work activity	**3.1**	Checks are made to ensure the completed work conforms with work instructions and to requirements for tools and devises produced
	3.2	Relevant person/s is notified of completion of work activity
	3.3	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned, made safe and sustainable energy practices are followed
	3.5	Workplace records are updated in accordance with work instructions and workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Producing routine tools/devices for carrying out energy sector work activities must be demonstrated in at least one of the following disciplines:	• appliances • business equipment • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE143A Produce routine tools/devices for carrying out energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0034 Produce routine tools/devices for carrying out energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- dismantling and assembling electrical and electronic components
- following quality, workplace procedures and instructions
- following work schedule
- identifying and carrying out work activities
- obtaining and checking tools, equipment resources and materials
- producing products in accordance with work schedule
- updating work records
- using and returning tools, equipment, personal protective equipment (PPE), surplus resources and materials.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- scope of engineering practice work and responsibilities, including:
  - applying and working to ethical standards
  - maintaining currency in technical and regulatory developments
  - working with others in a project team
- relevant hand, fixed and portable tools, including:
  - associated hazards

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  - care and maintenance
  - cutting, shaping, drilling, threading, tapping, and finishing metallic, non-metallic and structural components
  - different types of tools and their purpose
  - requirements for use in the workplace
  - techniques for the correct and safe use
  - tools for dismantling and assembling electrical and electronic components
  - tools for measuring and marking out
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant quality workplace procedures
- relevant sustainable energy practices
- relevant tool, equipment, resources and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0035 Provide basic instruction in the use of electrotechnology apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to instruct customers/users in the use of electrotechnology apparatus.

It includes appropriate customer relations, using apparatus manufacturer instruction material, instructing methods and completing instruction documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to instruct in the use of electrotechnology apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented

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	1.3	Electrotechnology apparatus on which user is to be instructed is confirmed with work supervisor and/or relevant person/s
	1.4	Safety features and safe use of the electrotechnology apparatus are reviewed in accordance with manufacturer instructions
	1.5	Familiarity with the electrotechnology apparatus is gained by reference to manufacturer user instructions and applying them during a preliminary practice run through
	1.6	Materials required to instruct users in the use of electrotechnology apparatus are obtained in accordance with workplace procedures
2 Instruct user in the use of electrotechnology apparatus	**2.1**	Users are informed of safety features and safe use of electrotechnology apparatus in accordance with manufacturer instructions, regulatory requirements and safe work methods
	2.2	Users are instructed in the set up and use of the electrotechnology apparatus in accordance with manufacturer instructions
	2.3	Users are given the opportunity to ask questions and demonstrate they understand the safety aspects, set-up features and operation of the electrotechnology apparatus
	2.4	Manufacturer user instructions and other related electrotechnology apparatus documentation are given to the appropriate person/s
	2.5	Unplanned events are referred to supervisor for direction in accordance with workplace procedures
	2.6	Instructions are given efficiently, without damage to electrotechnology apparatus, the surrounding environment or services using sustainable energy practices

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Demonstration of unit must include:	• providing instruction relevant to electrotechnology apparatus and its control

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE020B Provide basic instruction in the use of electrotechnology apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0035 Provide basic instruction in the use of electrotechnology apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- communicating effectively with relevant stakeholders
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- evaluating user needs
- following manufacturer user instructions
- giving clear instructions in the safe use and features of the electrotechnology apparatus
- giving users the opportunity to ask questions and demonstrate understanding of the features and safe use of the electrotechnology apparatus
- instructing users in the use of specific items of electrotechnology equipment and systems
- obtaining relevant materials to assist with instructing users
- performing preliminary run through with apparatus to confirm familiarity
- providing users with relevant documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- customer relations purpose, techniques and procedures
- effective communication, including:
  - communicating with customers and suppliers
  - oral communication
  - written procedures and work instructions
- effective instructional techniques
- methods for evaluating user ability in the use of electrotechnology apparatus

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- methods for evaluating user instructional needs
- procedures for dealing with customers and customer issues
- relevant electrotechnology apparatus instruction, including how it is used efficiently and safely
- relevant manufacturer instructions and user material
- relevant WHS/OHS legislated and electrical regulations and legislations requirements
- relevant workplace documentation and work activities records, including:
  - methods for recording and maintaining work records
  - regulatory work record requirements
  - types of work activity maintenance records
- relevant workplace policies and procedures
- risk mitigation processes include safe work method statements
- safe and correct use of electrotechnology apparatus
- safety features of relevant electrotechnology apparatus.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0036 Provide engineering solutions for problems in complex multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide engineering solutions for problems in complex multiple path circuits.

It includes preparing tools, equipment and materials; and providing solutions for complex multiple path circuits. It also includes completing work and documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare tools, equipment and materials for problem solving	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed

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	1.3	Scope of circuit/s problems are obtained from documentation and/or work instructions to determine the work
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated with others
	1.5	Materials required for work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Provide solutions for complex multiple path circuits	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Inspect and test live work is conducted in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits are checked and isolated as required in accordance with WHS/OHS requirements and workplace procedures
	2.4	Methods used to solve circuit problems are used from measured and calculated values as they apply to complex multiple path circuits
	2.5	Unplanned situations are dealt with in accordance with WHS/OHS and approval of a relevant person
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment and/or services using sustainable energy practices
3 Complete work and documentation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve circuit problems is documented
	3.4	Work completion is documented and relevant person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving circuit problems must include at least two of the following:	• determining the operating parameters of an existing circuit • altering an existing circuit to comply with specified operating parameters • developing circuits to comply with a specified function and operating parameters • developing circuits to comply with specified functions using established methods

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0036 Provide engineering solutions for problems in complex multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing complex multiple path circuits
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- completing work and documenting problem-solving activities
- completing written justification of solutions
- coordinating work with others
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining the operating parameters of existing circuits
- inspecting and testing active systems
- obtaining and following work instructions
- obtaining and using tools, equipment and products
- preparing to solve problems in complex multiple path circuits
- providing effective solutions to circuit problems from measurements and calculations
- providing solutions for problems in complex multiple path circuits
- using sustainable energy practices in accordance with workplace procedures
- using testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex alternating current (a.c.) power and maximum power transfer theorem
- complex impedance
- mesh and nodal analysis for a.c. linear circuits
- mesh and nodal analysis for direct current (d.c.) linear circuits

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- Norton’s principles for d.c. linear circuits
- phasors
- problem-solving techniques
- relevant complex multiple path circuits
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, tools, equipment, product and testing devices
- relevant sustainable energy principles
- relevant tools, equipment and products
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- series and parallel a.c. linear circuits
- star-delta conversions
- superposition principles and Kirchhoff’s law applied to a.c. linear circuits
- superposition principles for d.c. linear circuits
- Thévenin and Norton theorems applied to a.c. linear circuits
- Thévenin’s principles for d.c. linear circuits
- transients
- voltage/current sources and Kirchhoff’s law for d.c. linear circuits.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to solving problems in complex multiple path circuits.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0037 Provide engineering solutions for uses of materials and thermodynamic effects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide engineering solutions for uses of materials and thermodynamic effects.

It includes selecting and using appropriate materials and dealing with thermodynamic effects relative to an engineering problem. It also includes using measuring instruments, applying appropriate theorems, and providing solutions derived from measurements and calculations and justification for engineering solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Select materials, tools and equipment to deal with thermodynamic effects	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3	Scope of engineering problems are identified from workplace documentation and/or work supervisor
	1.4	Advice is sought from the work supervisor to ensure the engineering work is coordinated with others
	1.5	Equipment, material and products required for engineering work are obtained in accordance with workplace procedures
	1.6	Tools and testing devices required for work are obtained and checked for correct operation and safety
2 Provide engineering solutions to deal with thermodynamic effects	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	The need to inspect and test active systems is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Systems are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Methods used to solve system problems are used from measured and calculated values as they apply to materials and thermodynamics
	2.5	Unplanned situations are dealt with in accordance with WHS/OHS requirements and approval of relevant person/s
	2.6	Engineering problems are solved without damage to apparatus, circuits, the surrounding environment and/or services using sustainable energy practices with minimum of waste
3 Complete work and document engineering solution/s	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve system problems

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is documented

3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE160A Provide engineering solutions for uses of materials and thermodynamic effects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0037 Provide engineering solutions for uses of materials and thermodynamic effects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- completing work and documenting solutions
- completing written justification of solutions
- coordinating work with others
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- inspecting and testing active systems
- obtaining and following work instructions
- obtaining and using tools, equipment and products
- preparing to provide solutions for the uses of materials and thermodynamics
- providing effective solutions to system problems from measurements and calculations
- providing solutions for the uses of materials and thermodynamics
- using sustainable energy practices in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques
- relevant apparatus, circuits, environment and services
- relevant inspection and testing methods
- relevant manufacturer specifications and operating instructions
- relevant material science and thermodynamics
- relevant measured and calculated values
- relevant job safety assessments or risk mitigation processes
- relevant sustainable energy principles

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- relevant tools, equipment, material, products and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to providing solutions for uses of materials and thermodynamic effects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0038 Provide solutions and report on routine electrotechnology problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solutions and report on electrotechnology problems.

It includes performing relevant numerical calculations to identify workplace electrotechnology problems, applying relevant problem-solving techniques, using a range of fundamental mathematical processes and techniques to resolve problems and documenting the solution/s.

Typical electrotechnology problems are those encountered in meeting routine performance requirements and compliance with industry standards, interpreting the operating parameters of equipment and dealing with equipment malfunctions. Typical reports are those based on routine structures and formats and require the application of routine communication fundamentals.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Perform fundamental numerical electrotechnology calculations**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
		1.2 Nature of the problem is identified from documentation or work supervisor to determine scope of work to be undertaken
		1.3 Problems are accurately documented in written and/or diagrammatic form to ensure issues are explicit and appropriate problem-solving methods used to resolve matter/s
		1.4 Constants and variables related to electrotechnology problem are identified from measured values or relevant documentation
		1.5 Methods for resolving electrotechnology problems are considered and discussed with appropriate person/s
		1.6 Electrotechnology problems are resolved using relevant numerical calculations with result outcome in accordance with relevant industry standards
		1.7 Solutions to electrotechnology problems are documented in accordance with workplace procedures
2	**Complete work calculations and report on solutions**	**2.1** Solutions used to solve workplace electrotechnology problems are recorded for inclusion in work/project and/or records/technical reports in accordance with workplace procedures
		2.2 Reporting requirements and structures are identified and used to prepare technical reports to communicate the calculated resolution to appropriate person/s
		2.3 Reports are produced to communicate the calculated solutions in accordance with workplace procedures
		2.4 Work completion is documented and appropriate person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Solving routine electrotechnology problems must include:	• numerical calculations relevant to equipment processes in the deployment of work functions • reporting their outcomes in accordance with industry requirements
Demonstration of solving routine electrotechnology problems must be conducted in relation to any of the following disciplines:	• computers • data communications • electrical • electronics • instrumentation • refrigeration and air conditioning

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE130A Provide solutions and report on routine electrotechnology problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0038 Provide solutions and report on routine electrotechnology problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- completing work and reporting on calculated solutions, including:
  - using standard reporting structures and forms to prepare and produce documents/technical reports
  - interpreting and communicating solutions in documents/technical reports to appropriate person/s in accordance with workplace procedures
- performing calculations to solve electrotechnology problems, including:
  - identifying problems in written and diagrammatic form
  - obtaining known constants and variables from an appropriate source to solve problems
  - solving problems using appropriate fundamental calculations to achieve realistic and accurate outcomes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrotechnology numeracy, including:
  - decimals
  - fractions and indices
  - percentages
  - graphs
  - multiples and sub-multiples
  - ratios and proportions
  - transposition
  - areas and volumes
  - trigonometry and Pythagoras' Theorem
  - construction of angles and triangles

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  - transposition of equations
  - conversion of units of measurement
- electrotechnology literacy, including:
  - reading comprehension
  - spelling
  - sentence construction (syntax)
  - grammar.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0039 Provide solutions to basic engineering computational problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solutions to engineering computational problems.

It includes applying problem-solving techniques, using a range of mathematical processes and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Provide computational solutions to engineering problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of problem/s is obtained from documentation and/or from work instructions to determine work

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	1.3	Problems are documented and/or diagrammatic form and appropriate methods identified to resolve them
	1.4	Constants and variables to the problem are obtained from measured values and/or problem documentation
	1.5	Alternative methods for resolving the problem are considered and, as required, discussed with relevant person/s
	1.6	Problems are resolved using mathematical processes in accordance with workplace procedures
2 Complete work and documentation	**2.1**	Justification for solutions used to solve engineering problems is documented in work records in accordance with workplace procedures and relevant industry standards
	2.2	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Engineering diagnosis development and work functions must include at least the following:

- working safety
- applying problem-solving techniques
- using a range of mathematical processes
- provision of electrical/electronic engineering problem solutions
- solutions justification

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE126A Provide solutions to basic engineering computational problems.

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Assessment Requirements for UEECD0039 Provide solutions to basic engineering computational problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- completing work and documenting problem-solving activities
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- documenting justification of solutions provided
- obtaining known constants and variables
- solving problems using appropriate mathematical processes
- stating problems in documented and diagrammatic form.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- algebraic manipulation
- complex numbers
- estimations, errors and approximations
- exponential and logarithmic functions
- graphs of linear functions
- graphs of trigonometric functions
- laws of indices
- matrices
- plane figures - quadrilaterals and circles
- plane figures – triangles and basic trigonometry
- problem-solving techniques
- quadratic functions

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- rational, irrational numbers and algebra
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instruction, policies and procedures
- simultaneous equations
- vectors and phasors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to providing computational solutions to basic engineering problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0040 Solve basic problems electronic and digital equipment and circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to Solve basic problems electronic and digital equipment and circuits and circuits.

It includes working safely, applying problem-solving procedures, using measuring devices, providing solutions derived from equipment behaviour and measurements, and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to work on electronic and digital equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3 Scope of problem is obtained from documentation and/or work supervisor to determine the work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are identified and accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Solve electronic and digital equipment problems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Methods are used to solve electronic and digital equipment problems from observation or equipment behaviour and measured values
	2.5 Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to solve circuit problems is documented

3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE123A Solve basic problems electronic and digital equipment and circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0040 Solve basic problems electronic and digital equipment and circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- checking and isolating circuits in accordance with WHS/OHS requirements and workplace procedures
- completing work and documenting problem-solving activities
- dealing with unplanned situations
- deducing equipment behaviour correctly and accurately
- identifying and accessing sources of materials required for work
- observing equipment behaviour and measured values
- obtaining and checking tools, equipment and testing devices
- obtaining problem scope
- preparing to work on electronic and digital equipment
- providing written justification for the solutions to problems
- solving electronic and digital equipment problems without damage using sustainable energy practices
- taking and recording measurements correctly and accurately using relevant measuring equipment
- testing and measuring live work in accordance with WHS/OHS requirements and workplace procedures
- using problem-solving methods.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- alternating currents (a.c.) and waveforms
- analogue to digital conversion
- analogue versus digital

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- basic electronic components
- basic logic
- batteries
- capacitance and inductance
- codes
- data manipulation
- digital to analogue conversion
- electromagnetic interference
- electromagnetic waves and signals
- fundamental concepts
- isolation procedures
- number systems
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications and operating procedures
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- relevant electronic and digital equipment problems
- sustainable energy principles
- techniques in the use of multimeters
- testing and measuring live work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to solving basic problems in electronic and digital equipment

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEECD0041 Solve electrotechnical engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve electrotechnical engineering problems.

It includes working safely, applying problem-solving techniques, using a range of mathematical processes and techniques to provide solutions to electrotechnical problems, and documenting solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Provide calculated solutions to electrotechnical engineering problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 Scope of the problems are obtained from documentation and/or from work supervisor to determine work to be

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		undertaken
	1.3	Problems are stated in writing and/or diagrammatic form to ensure they are identified, and relevant methods used to resolve them
	1.4	Constants and variables related to the problem are obtained from measured values and/or problem documentation
	1.5	Alternative methods for resolving the problem are considered and, as required, discussed with relevant person/s
	1.6	Problems are solved using relevant mathematical processes and techniques within relevant industry standards
2 Complete work and document calculated solutions to electrotechnical activities	**2.1**	Justification for solutions used to solve electrotechnical engineering problems is documented in work/project development records in accordance with relevant industry standards
	2.2	Work completion is documented and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE129A Solve electrotechnical engineering problems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0041 Solve electrotechnical engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- completing work and documenting calculated solutions to electrotechnical activities
- documenting justification of solutions provided in accordance with relevant industry standards
- obtaining known constants and variables from relevant sources
- obtaining scope of problem from documentation and/or work supervisor
- providing calculated solutions to electrotechnical engineering problems
- solving problems using relevant calculations
- stating problems in written and/or diagrammatic form.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- capacitance in alternating current (a.c.) circuits
- capacitance/capacitors
- electromagnetic induction
- impedance in a.c. circuits
- inductance in a.c. circuits
- magnetism and electromagnetism
- measurement of electrical quantities
- parallel circuits
- phase relationships in a.c. circuits
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - diagrammatic form
  - work/project development records
- relevant workplace policies and procedures
- resistance
- series circuits
- series/parallel circuits
- single-source resistive a.c. circuits of various frequencies
- sinusoidal alternating voltage and current
- test equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to applying calculations required to solve electrotechnical problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0042 Solve problems in ELV single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solutions to predictable problems in single path circuits operated at extra-low voltage (ELV) as they apply to energy sector work functions.

It includes working safely; using voltage, current and resistance measuring devices; and providing solutions to predictable circuit problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on ELV single path electrical circuits	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for the relevant work area are identified and applied
	1.2 Hazards are identified, risks are assessed, and control measures and workplace procedures are implemented

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	1.3	Nature of the circuit/s problem is obtained from relevant documentation or work supervisor to determine the scope of work to be undertaken
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for the work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Solve ELV single path electrical circuits problem	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Need to test or measure live electrical work is determined and conducted in accordance with WHS/OHS, workplace and regulatory requirements
	2.3	Circuits are confirmed as being isolated, as required, in accordance with WHS/OHS, workplace and regulatory requirements
	2.4	Methodological techniques are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits in accordance with workplace procedures
	2.5	Problems are solved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activity	**3.1**	WHS/OHS risk control measures for work completion are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve circuit problems is documented in accordance with workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in ELV single path circuits must include three of the following types of circuit problems:	• identifying and locating open circuits • identifying and locating short circuits • identifying loss of supply

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE103A Solve problems in ELV single path circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0042 Solve problems in ELV single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - checking tools, materials, equipment and testing devices for correct operation and safety
  - ensuring circuits are isolated
  - testing or measuring on live circuits and operating systems safely
  - using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation, including documenting problem-solving activities
- identifying and accessing relevant materials
- maintaining a clean work site and equipment
- planning work on extra-low voltage (ELV) single path electrical circuits
- referring to relevant documentation to determine the circuit problem
- solving problems in ELV single path electrical circuits, including:
  - altering an existing circuit to comply with specified operating parameters
  - dealing with unplanned events
  - developing circuits to comply with a specified function and operating parameters
- determining the operating parameters of an existing circuit
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- basic electrical concepts, including:
  - electrotechnology industry
  - static and current electricity

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  - production of electricity by renewable and non-renewable energy sources
  - transportation of electricity from the source to the load via the transmission and distribution systems
  - utilisation of electricity by the various loads
  - basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity
- basic electrical circuit, including:
  - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
  - purpose of each component in the circuit
  - effects of an open circuit, a closed circuit and a short circuit
  - multiple and sub-multiple units
- effects of electrical current, including:
  - physiological effects of current and the fundamental principles listed in AS/NZS 3000 for protection against this effect
  - basic principles by which electric current can result in the production of heat, the production of magnetic fields, and a chemical reaction
  - typical uses of the effects of current
  - mechanisms by which metals corrode
  - fundamental principles listed in AS/NZS 3000 for protection against the damaging effects of current
- electromotive force (EMF) sources, energy sources and conversion electrical energy, including:
  - basic principles of producing an emf from the interaction of a moving conductor in a magnetic field
  - basic principles of producing an emf from the heating of one junction of a thermocouple
  - basic principles of producing an emf by the application of sun light falling on the surface of photovoltaic (PV) cells
  - basic principles of generating an emf when a mechanical force is applied to a crystal (piezo electric effect)
  - principles of producing an electrical current from primary, secondary and fuel cells
  - input, output, efficiency or losses of electrical systems and machines
  - effect of losses in electrical wiring and machines
  - principle of conservation of energy
- resistors, including:
  - features of fixed and variable resistor types and typical applications
  - identification of fixed and variable resistors
  - various types of fixed resistors used in the electrotechnology industry e.g. wire-wound, carbon film and tapped resistors
  - various types of variable resistors used in the electrotechnology industry e.g. adjustable resistors: potentiometer and rheostat, light dependent resistor (LDR), voltage dependent resistor (VDR), negative temperature dependent resistor (NTC) positive temperature

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dependent resistor (PTC)
    - characteristics of temperature, voltage and light dependent resistors and typical applications of each
    - power ratings of a resistor
    - power loss (heat) occurring in a conductor
    - resistance of a colour coded resistor from colour code tables and confirm the value by measurement
    - measurement of resistance of a range of variable resistors under varying conditions of light, voltage and temperature conditions
- Ohm's law, including:
    - basic direct current (d.c.) single path circuit
    - voltage and current levels in a basic d.c. single path circuit
    - effects of an open circuit, a closed circuit and a short circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit
    - determining voltage, current and resistance in a circuit given any two of these quantities
    - graphical relationships of voltage, current and resistance
    - relationship between voltage, current and resistance
- electrical power, including:
    - relationship between force, power, work and energy
    - power dissipated in circuit from voltage, current and resistance values
    - power ratings of devices
    - measurement of electrical power in a d.c. circuit
    - effects of power rating of various resistors
- relevant electrical regulations and legislations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- series circuits, including:
    - circuit diagram of a single source d.c. series circuit
    - identification of the major components of a series circuit: power supply, loads, connecting leads and switch
    - applications where series circuits are used in the electrotechnology industry
    - characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series circuit
    - the voltage, current and resistances or power dissipated from measured or given values of any two of these quantities
    - relationship between voltage drops and resistance in a simple voltage divider network
    - setting up and connecting a single-source series d.c. circuit

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  - measurement of resistance, voltage and current values in a single source series circuit
  - effect of an open circuit on a series connected circuit
- sustainable energy principles and practices
- techniques to confirm that a circuit is isolated
- techniques to check if tools, equipment and testing devices are operating correctly and safely.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0043 Solve problems in direct current circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine correct operation of single source direct current (d.c.) series, parallel and series-parallel circuits and provide solutions to various electrotechnology work functions.

It includes working safely; using voltage, current and resistance measuring devices; and providing solutions to measurement and calculation problems derived from single and multiple path circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify d.c. electrical circuits	**1.1** Nature of the circuit problem is obtained from relevant documentation, electrical drawings or personnel to determine the scope of work to be undertaken
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.3 Tools, equipment and circuit measuring devices required for the electrical work are obtained and checked for correct operation and safety in accordance with workplace procedures
	1.4 Electrical apparatus is visually inspected, and components and circuits are identified
2 Determine electrical d.c. circuit problem	**2.1** Electrical hazards are identified, risks are assessed and control measures are implemented
	2.2 Need to test or measure live electrical work is conducted in accordance with WHS/OHS workplace safety procedures and regulatory requirements
	2.3 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	2.4 Expected circuit parameters are calculated from relevant component ratings/specifications
	2.5 Circuit parameters are measured in accordance with industry standards and checked against expected values
	2.6 D.c. circuit problems are assessed from measured and calculated values using established methodologies as they apply to circuits
	2.7 Circuit solutions are determined from measured and calculated values of resistance, voltage, current and power in series, parallel, and series-parallel circuits in accordance with industry standards
	2.8 Solutions are tested in accordance with workplace procedures and industry standards
	2.9 Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using

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		sustainable energy practices
	2.10	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve circuit problems is documented
	3.4	Work completion is documented, electrical drawings are updated, and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE104A Solve problems in d.c. circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0043 Solve problems in direct current circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- altering an existing circuit to comply with specified operating parameters
- applying Ohm's Law to solve problems in direct current (d.c.) single path circuits
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including identifying risks and applying risk control measures
- calculating resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature and material
- connecting analogue/digital ammeter into a circuit ensuring the polarities are correct to take current readings
- connecting a series d.c. circuit containing capacitor and resistor to determine the time constant of the circuit
- calculating quantities from given information to determine capacitance, energy and voltage
- calculating one time constant as well as the time taken to fully charge and discharge a given capacitor
- calculating equivalent capacitance of capacitors connected in series and parallel circuits
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- demonstrating graphical relationships of voltage, current and resistance
- calibrating and using measuring device in accordance with manufacturer specifications
- determining the operating parameters of an existing circuit
- developing circuits to comply with a specified function and operating parameters
- identifying and applying electrical industry standard symbols to represent electrical components in circuit diagram
- identifying fixed and variable resistors, including:
  - determining resistance of a colour coded resistor from colour code tables and confirming the value by measurement
  - measuring resistance of variable resistors under varying conditions of light, voltage and/or temperature
  - selecting a resistor for an application
- solving problems in series and series-parallel circuits, including:

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  - developing, setting up and connecting a single source d.c. series-parallel circuit
  - measuring voltage and current
  - calculating resistance, voltage, current and power from measured and/or given values of any two of these quantities in a single source series-parallel circuit
- using test equipment to confirm the effect of material length, cross-sectional area and temperature on the resistance of conductive materials
- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- using measuring devices to Solve problems in direct current circuits
- using meters for problem solving, including measuring resistance using direct, volt-ammeter and/or bridge methods
- using methodical techniques to solve d.c. circuit problems from measured and calculated values.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical concepts, including:
  - calculations involving quantity of electricity, velocity and speed
  - distribution of electricity from the source to the load via the transmission systems
  - principle of conservation of energy
  - production of electricity, including:
    - renewable and non-renewable energy sources
    - static and current electricity
  - utilisation of electricity by the various loads
- electrical circuit, including:
  - industry standard symbols used to represent components in an electrical circuit diagram
  - multiple and sub-multiple units
  - purpose of each component in the electrical circuit
- Ohm’s Law, including:
  - d.c. single path circuit
  - determining voltage, current and resistance in a circuit
  - effects of an open circuit, a closed circuit and a short circuit on a d.c. single path
  - relationship between voltage and current from measured values in a circuit
  - graphical relationships of voltage, current and resistance
  - relationship between voltage, current and resistance
  - voltage and current levels in a d.c. single path circuit
- electrical power, including:
  - effects of power rating of various resistors
  - methods for measuring of electrical power in a d.c. circuit

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    - power dissipated in circuit from voltage, current and resistance values
    - power ratings of electrical devices
    - relationship between force, power, work and energy
- effects of electrical current, including:
    - relevant industry standards relating to fundamental principles for protection against the damaging effects of current
    - mechanisms by which metals corrode
    - principles by which electric current can result in the production of:
        - heat
        - magnetic fields
        - a chemical reaction
    - typical uses of electrical current
    - physiological effects of current
- electromotive force (EMF) sources and conversion of electrical energy, including:
    - input, output, efficiency and losses of electrical systems and machines
    - principles of generating an EMF, including:
        - when a mechanical force is applied to a crystal
        - when moving a conductor in a magnetic field
        - by the application of light falling on the surface of photovoltaic (PV) cells
        - from the heating of one junction of a thermocouple
    - principles of producing an electrical current from primary, secondary and fuel cells
- resistors, including:
    - types and applications of fixed and variable resistors used in the electrotechnology industry
    - characteristics of variable resistors used in the electrotechnology industry, including:
        - adjustable resistors: potentiometer and rheostat
        - light dependent resistor (LDR)
        - voltage dependent resistor (VDR)
        - temperature dependent resistor
    - power ratings of a resistor
    - power loss (heat) occurring in a conductor
    - resistor colour code tables
- series, parallel, and series-parallel circuits, including:
    - applications where these circuits are used in the electrotechnology industry
    - characteristics of series, parallel, and series-parallel circuits, including:
        - connection of loads
        - current path
        - voltage drops
        - power dissipation
        - effects of an open circuit

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  - diagrams of single source d.c. series, parallel, and series-parallel circuits
  - identification of the components of series, parallel, and series-parallel circuits, including power supply, loads, connecting leads and switch
  - relationship between voltage drops and resistance in a simple voltage divider network
  - techniques for determining voltage, current, resistances or power dissipated from measured or given values (of any two of these quantities)
  - relationship between branch currents and resistances in a two-branch parallel and series-parallel current divider network
- factors affecting the resistance of a conductor, including:
  - conductor length
  - cross-sectional area
  - resistivity
  - changes in temperature and material
  - effect the change in cross-sectional area, length and type of material has on the resistance of a conductor
  - effects of resistance on the current-carrying capacity and voltage drop in cables
  - effects of temperature change on the resistance of various conducting materials
- effects of measuring devices in a circuit, including:
  - advantages and disadvantages of each voltage indicator tester
  - calibration and use of the measuring device
  - methods for connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and taking various voltage readings
  - correct techniques to read the scale of an analogue meters and how to reduce the ‘parallax’ error
  - hazards associated with the use of measuring devices, including polarity
  - hazards involved in using electrical instruments and the safety control measures that should be taken
  - instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used
  - methods for using insulation resistance measuring devices to relevant industry standards
  - loading effect of various voltmeters when measuring voltage across various loads
  - methods for measuring resistance using direct, volt-ammeter and bridge methods
  - non-contact voltage indicator types and use
  - operating characteristics of analogue and digital meters
  - connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and taking various voltage readings
  - operation of various voltage indicator testers
  - purpose and characteristics of a voltmeter
  - purpose of an ammeter and the correct connection (series) of an ammeter into a circuit
  - reasons the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity

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  - methods for selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
  - types of voltage indicator testers, including light-emitting diode (LED), neon, solenoid, volt-stick and series tester and the purpose of each voltage indicator tester
  - methods for using voltage indicator testers to detect the presence of various voltage levels
- capacitors and capacitance, including:
  - construction of a standard capacitor
  - different types of dielectric material and each dielectric's relative permittivity
  - types of capacitors commonly used in the electrotechnology industry
  - industry standard symbol of various types of capacitors, including standard, variable, trimmer and polarised
  - terms and units for capacitance, electric charge and energy
  - factors affecting capacitance
  - behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves
  - arrangement of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit
- capacitors in series and parallel, including:
  - application of capacitors in the electrotechnology industry
  - common faults in capacitors
  - arrangement of capacitors in series and/or parallel configurations to achieve various capacitance values
  - equivalent capacitance of capacitors connected in series and parallel
  - effects of capacitors connected in parallel by calculating their equivalent capacitance
  - effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance
  - hazards involved in working with capacitance effects and the safety control measures that should be taken, including safe handling and the correct methods of discharging various size capacitors, dangers of a charged capacitor and the consequences of discharging a capacitor through a person
  - testing of capacitors to determine serviceability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment (including single source series, parallel and series-parallel d.c. circuits) and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0044 Solve problems in multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in multiple path circuits.

It includes working safely; applying problem-solving procedures, including the use of voltage, current and resistance measuring devices; and providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on multiple path circuits	**1.1** Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for a given work

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		area are identified and applied
	1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented
	1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others
	1.5	Materials required for work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Solve multiple path circuit problems	**2.1**	The need to test or measure live is determined in accordance with WHS/OHS requirements and when necessary conducted in accordance with workplace procedures
	2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements
	2.3	Expected circuit parameters are calculated from relevant component ratings/specifications
	2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values
	2.5	Circuit problems are assessed using measured and calculated values as they apply to multiple path circuits
	2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current and power in extra-low voltage (ELV) multiple path circuits
	2.7	Solutions are tested in accordance with workplace procedures and industry standards
	2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices
	2.9	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to personnel and equipment
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to resolve circuit problems is documented

3.4 Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installation, fault finding, maintenance or development work functions in multiple path circuits must be demonstrated in one of the following disciplines:

- computers
- data communications
- electrical
- electronics
- fire protection
- instrumentation
- refrigeration and air conditioning
- renewable and sustainable energy systems
- security technology

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0044 Solve problems in multiple path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
  - identifying and assessing hazards and risks
  - implementing control measures
  - safely measuring the parameters for the whole or any part of a d.c. circuit
- working safety with electric circuits in the electrotechnology sector, including:
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
  - applying protections against the physiological effects of electrical currents
- calculating values of voltage, current and resistance in single source series/parallel circuits given any two of these quantities
- calculating power in single source series/parallel circuits from known values of voltage, current and/or resistance
- connecting a parallel circuit: power supply, protection device, switch and loads
- connecting a series/parallel circuit: power supply, protection device, switch and loads
- measuring values of voltage and current in single source ELV series/parallel circuits
- measuring values of resistance, including insulation resistance and continuity/no continuity
- measuring values of capacitance
- testing capacitors to determine serviceability
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- using methodical techniques to solve circuit problems from measured and calculated values
- ensuring compliance with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- factors affecting resistance, including:
  - four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
  - affect the change in the type of material (resistivity) has on the resistance of a conductor
  - affect the change in 'length' has on the resistance of a conductor
  - affect the change in 'cross-sectional area' has on the resistance of a conductor
  - effects of temperature change on the resistance of various conducting materials
  - effects of resistance on the current-carrying capacity and voltage drop in cables
  - techniques for calculation of the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature
  - using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium, nichrome and tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature
- series/parallel circuits including:
  - schematic diagram of a single source d.c. series/parallel circuit
  - identification of the major components of a series/parallel circuit (power supply, protection device, switch and loads)
  - applications where series/parallel circuits are used in the electrotechnology industry
  - characteristics of a series/parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a series/parallel circuit)
  - relationship between voltages, currents and resistances in a bridge network
  - calculation of the total:
    - resistance of a series/parallel circuit
    - current of a series/parallel circuit
    - voltage and the individual voltage drops of a series/parallel circuit
  - techniques for setting up and connecting a single source d.c. series/parallel circuit
  - resistance, voltage and current measurements in a single source d.c. series/parallel circuit
  - the voltage, current, resistances or power dissipated from measured values of any two of these quantities
- parallel circuits including:
  - schematic diagram of a single source d.c. parallel circuit
  - identification of the major components of a parallel circuit (power supply, protection device, switch and loads)
  - applications where parallel circuits are used in the electrotechnology industry
  - characteristics of a parallel circuit (load connection, current paths, voltage drops, power dissipation, and effects of an open circuit in a parallel circuit)
  - relationship between currents entering a junction and currents leaving a junction
  - relationship between branch currents and resistances in a two-branch current divider

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network
    - methods to calculate total:
        - resistance of a parallel circuit
        - current of a parallel circuit
        - voltage and the individual voltage drops of a parallel circuit
    - techniques for setting up and connecting a single source d.c. parallel circuit
    - resistance, voltage and current measurements in a single source parallel circuit
    - voltage, current, resistance or power dissipated from measured values of any of these quantities
    - output current and voltage levels of connecting cells in parallel
- meters in a circuit, including:
    - types, operating characteristics and purpose of instruments/meters used to measure voltage, current, resistance and insulation resistance
    - advantages and disadvantages of different instruments/meters commonly used in the field
    - hazards involved in using electrical instruments/meters and relevant safety control measures
    - techniques to correctly connect and accurately read instruments/meters used in the field and common errors that may occur when connecting and reading meters
    - consequences of incorrect connection of instruments/meters into a circuit
    - techniques for calculation of resistance values using voltmeter and ammeter reading
- resistance measurement, including:
    - types, operating characteristics, purpose and storage of instruments to measure resistance (including insulation resistance)
    - functions of various analogue and digital insulation resistance testers
    - reasons why the supply must be isolated prior to using the insulation resistance tester
    - where and why the continuity test and insulation resistance test would be used in an electrical installation
    - the voltage ranges of an insulation resistance tester and where each range may be used
    - AS/NZS 3000 requirements for resistance measurement/testing
    - purpose and method to carry out a calibration check on an resistance tester
    - techniques for measurement of:
        - low values of resistance using a resistance tester continuity functions
        - high values of resistance using a resistance tester insulation resistance function
        - resistance using volt-ammeter methods
- capacitors and capacitance including:
    - techniques for identification of various types of capacitors commonly used in the electrotechnology industry
    - circuit symbol of various types of capacitors: standard, variable, trimmer and polarised
    - terms and units for capacitance and electric charge
    - behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves

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  - techniques for calculation of quantities from given information: capacitance, charge and voltage
  - techniques for calculation one time constant as well as the time taken to fully charge and discharge a given capacitor
  - techniques for connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit
- capacitors in series and parallel, including:
  - hazards involved in working with capacitance effects and the safety control measures that should be taken
  - safe handling and the correct methods of discharging various size capacitors
  - dangers of a charged capacitor and the consequences of discharging a capacitor through a person
  - effects of capacitors connected in parallel by calculating their equivalent capacitance
  - effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance
  - techniques for connecting capacitors in series and/or parallel configurations to achieve various capacitance values
  - common faults in capacitors
  - techniques for testing of capacitors to determine serviceability
  - application of capacitors in the electrotechnology industry.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in multiple path extra-low voltage (ELV) alternating current (a.c.) circuits.

It includes working safely, applying problem-solving procedures, measuring devices, and providing solutions from measurements and calculations to problems in multiple path circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on multiple path ELV a.c. electrical circuits	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of circuit problem is obtained from documentation and/or work supervisor
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for work are identified and accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Solve multiple path ELV a.c circuit problems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Methods are used to solve a.c circuit problems from measured and calculated values as they apply to multiple

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		path electrical circuits
	2.5	Unplanned situations are dealt with safely in accordance with workplace procedures and approval of relevant person/s
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve circuit problems is documented
	3.4	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Circuit problems must include at least two of the following:	• determining the operating parameters of an existing circuit • altering an existing circuit to comply with specified operating parameters • developing circuits to comply with a specified function and operating parameter

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE119A Solve problems in multiple path extra-low voltage (ELV) a.c. circuits.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- checking and isolating circuits
- identifying and assessing sources of materials required for work
- obtaining and checking tools, equipment and testing devices for correct operation and safety using sustainable energy practices
- obtaining scope of circuit/s from documentation and/or work supervisor
- preparing to work on multiple path extra-low voltage (ELV) alternating current (a.c.) electrical circuits
- seeking advice from the work supervisor
- solving a.c. circuits problems from measuring and calculating values
- testing and measuring live circuits
- dealing with unplanned situations safely and with the approval of relevant person/s
- workplace documenting, including:
  - justifications solution
  - work completion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant capacitance in a.c. circuits
- relevant impedance
- relevant inductance in a.c. circuits
- relevant isolation of circuits

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- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, tools, equipment and testing devices
- relevant methods to measure and calculate values
- relevant phasors
- relevant power and power factor
- relevant resistance in a.c. circuits
- relevant resonance
- relevant sinusoidal alternating voltage and current
- relevant test and measure live work procedures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment used in industry
- resources that reflect current industry practices in relation to solving problems in multiple path ELV a.c. circuits
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0046 Solve problems in single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in single path circuits.

It includes working safely; applying problem-solving procedures, including the use of basic voltage, current and resistance measuring devices; and providing known solutions to predictable circuit problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on single path electrical circuits	**1.1** Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented
	1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others
	1.5	Materials required for work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Solve problems in single path electrical circuits	**2.1**	The need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, when necessary, conducted in accordance with workplace procedures
	2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements
	2.3	Expected circuit parameters are calculated from relevant component ratings/specifications
	2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values
	2.5	Circuit problems are assessed using measured and calculated values as they apply to single path, single source circuits
	2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current, and power in single path circuits
	2.7	Solutions are tested in accordance with workplace procedures and industry standards
	2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Complete work and document problem solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to solve circuit problems is documented

3.4 Work completion is documented, and relevant personnel are notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installation, fault finding, maintenance or development work functions of single source series circuits containing more than one load must be demonstrated in one of the following disciplines:	• computers • data communications • electrical • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable and sustainable energy systems • security technology

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0046 Solve problems in single path circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
  - identifying and assessing hazards and risks
  - implementing control measures
  - safely measuring the parameters for the whole or any part of a d.c. circuit
- working safety with electric circuits in the electrotechnology sector, including:
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
  - applying protections against the physiological effects of electrical currents
- determining the operating parameters of an existing circuit
- calculating values of voltage, current and resistance in single source series circuits given any two of these quantities
- calculating power in single source series circuits from known values of voltage and current and/or resistance
- connecting a series circuit: power supply, protection device, switch and load
- measuring values of voltage and current in single source series circuits
- measuring values of resistance
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- identifying loss of supply
- using methodical techniques to solve circuit problems from measure and calculated values
- ensuring compliance with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- electrical concepts, including:
  - static and current electricity
  - production of electricity by renewable and non-renewable energy sources
  - transportation of electricity from the source to the load via the transmission and distribution systems
  - utilisation of electricity by the various loads
  - basic calculations involving quantity of electricity
- electrical circuits, including:
  - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
  - purpose of each component in the circuit
  - effects of an open circuit, a closed circuit and a short circuit
  - multiple and sub-multiple units
- Ohm's Law including:
  - direct current (d.c.) single path circuit
  - voltage and currents levels in a basic d.c. single path circuit
  - effects of an:
    - open circuit
    - a closed circuit and a short circuit on a basic d.c. single path
  - relationship between voltage and current from measured values in a simple circuit
  - determining voltage, current and resistance in a circuit given any two of these quantities
  - graphical relationships of voltage, current and resistance
  - relationship between voltage, current and resistance
- electrical power, including:
  - relationship between force, power, work and energy
  - power dissipated in circuit from voltage, current and resistance values
  - power ratings of devices
  - methods for measuring electrical power in a d.c. circuit
  - effects of power rating of various resistors
- effects of electrical current, including:
  - physiological effects of current
  - principles by which an electric current can produce heat, light, motion and a chemical reaction
  - typical uses of the effects of current
  - mechanisms by which metals corrode
  - fundamental principles listed in AS/NZS 3000 for protection against the damaging effects of current
- electromotive force (EMF) sources and conversion of electrical energy, including:
  - input/output (I/O), efficiency and losses of electrical systems and machines

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    - principles of generating an EMF, including:
        - when a mechanical force is applied to a crystal
        - when moving a conductor in a magnetic field
        - by the application of light falling on the surface of photovoltaic (PV) cells
        - from the heating of one junction of a thermocouple
    - principles of producing an electrical current from primary, secondary and fuel cells
- resistors, including:
    - types and applications of fixed and variable resistors used in the electrotechnology industry
    - identification of fixed and variable resistors
    - characteristics of temperature, voltage and light dependent resistors and typical applications of each
    - power ratings of a resistor
    - power loss (heat) occurring in a conductor
    - resistor colour code tables
    - specifying a resistor for a particular application
- series circuits, including:
    - circuit diagram of a single source single path circuit
    - identification of the major components of a series circuit: power supply, protection device, switch and loads
    - applications where series circuits are used in the electrotechnology industry
    - characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series circuit
    - the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
    - relationship between voltage drops and resistance in a simple voltage divider network
    - techniques for setting up and connecting a single source single path circuit
    - methods for measurement of resistance, voltage and current values in a single source single path circuit
    - effect of an open circuit on a series connected circuit.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0047 Supervise and coordinate energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to supervise and coordinate energy sector work activities.

It encompasses working safety, implementing safety procedures and processes, sequencing work activities, providing guidance and work instructions to others, ensuring job requirements are met and maintaining necessary work documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to supervise and coordinate work activities	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Job specification and requirements are obtained and applied
	1.3	Plant, materials and skills needed for work are determined from specifications and relevant documentation
	1.4	Plant, materials and person/s required for work are accessed in accordance with workplace procedures
2 Supervise work activities and complete documentation	**2.1**	WHS/OHS and workplace procedures are implemented and monitored
	2.2	Guidance and work instructions are given to relevant person/s to ensure work is sequenced and completed in accordance with job specifications and requirements
	2.3	Cooperation is sought from others involved in the work to ensure aspects of work are coordinated effectively
	2.4	Work progress is monitored in accordance with schedules, job specifications and requirements
	2.5	Conflict issues at the worksite are dealt with in accordance with workplace procedures
	2.6	Requested variations to job specification are dealt with in accordance with workplace procedures
	2.7	Methods for dealing with unplanned situations are applied in accordance with WHS/OHS and workplace procedures
3 Document supervision and coordination activities	**3.1**	Job records are maintained in accordance with workplace procedures
	3.2	Processes are followed to ensure activities are carried out in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE114A Supervise and coordinate energy sector work activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0047 Supervise and coordinate energy sector work activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- accessing appropriate plant, materials and personnel
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- dealing with conflicts in accordance with workplace procedures
- dealing with job variations in accordance with workplace procedures
- dealing with unplanned situations in accordance with established workplace procedures
- documenting supervision and coordination activities
- ensuring work completion documentation is accurate and forwarded to appropriate person/s
- obtaining and applying job specification and requirements
- obtaining the cooperation of others
- preparing to supervise and coordinate work activities
- providing guidance and instructions to relevant person/s
- supervising and coordinating work activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- analytical techniques in problem solving
- dispute resolution
- effective instruction methods
- methods for seeking the cooperation of others
- problem-solving techniques
- relevant job specifications and requirements
- relevant manufacturer specifications
- relevant plant, materials and skills
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures
- responsibilities of workplace supervisors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to supervising and coordinating energy sector work activities
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0048 Undertake computations in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to undertake computations in an energy sector environment.

It includes determining and applying computational mathematical methods to solve problems or to enhance given data in an energy sector environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine computation methods	**1.1** Computational activities are planned and prepared to ensure work health and safety (WHS)/occupational health and safety (OHS) workplace policies and procedures are followed with the work appropriately sequenced in accordance with job requirements

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	1.2	Data for computations is obtained and verified in accordance with workplace procedures to comply with job requirements
	1.3	Location in which activities are undertaken or data gathered is determined from job outcome requirements
	1.4	Applicable computation methods are determined and calculations applied relevant to data gathered and job outcome requirements
	1.5	Information technology needed to carry out the computations is obtained in accordance with workplace procedures
2 Undertake computations	**2.1**	Computations are undertaken and appropriate calculations applied relevant to data gathered and in accordance with job outcome requirements
	2.2	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.3	Ongoing checking and validating of the quality/accuracy of the calculation work results are undertaken in accordance with workplace procedures
3 Complete computation activities	**3.1**	Computation results are verified and checked against estimates
	3.2	Documentation/reports/computations are completed to ensure all job requirements are met
	3.3	Work is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE150A Undertake computations in an energy sector environment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0048 Undertake computations in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying appropriate calculation methods relevant to data gathered and job outcome requirements
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements
- dealing with unplanned events
- understanding transporting instructions
- checking transport details against job instruction
- obtaining relevant plant and equipment
- transporting plant and equipment in accordance with requirements
- notifying work completion
- undertaking computations in accordance with requirements.
-

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- energy sector applied mathematical concepts of engineering mathematics with calculus, including:
  - mathematical linear measurement in engineering situations encompassing:
    - precision and error in mathematical computations
    - displaying mathematical outcomes in the correct format using the appropriate significant figures and in scientific notation
    - perimeters of plane figures, polygons and the perimeter of shapes involving arcs
    - Pythagoras' theorem to engineering situations
  - mathematical spatial measurement in engineering situations encompassing:
    - areas of combined shapes
    - volume and surface areas of solids

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- right triangle trigonometry in engineering problem solving encompassing:
  - problems using the six trigonometrical ratios
  - problems involving compass bearings and angles of elevation/depression
  - trigonometrical concepts in problems involving inclined planes, vectors and forces and electrical sinusoidal waveforms
- sine and cosine rules in practical applications encompassing:
  - sine rule to solve unknown dimensions/angles in triangles
  - cosine rule to solve unknown dimensions/angles in triangles
- mathematical concepts in basic surveying and computation of areas encompassing:
  - mathematical concepts for radial and triangulation surveys
  - Simpson's Rule in engineering applications
- basic algebra in engineering calculations encompassing:
  - basic operations involving substitutions, additions, removal of brackets, multiplication and divisions
  - solving linear equations
  - transportation in non-linear equations
- linear graphical techniques in engineering problem solving encompassing:
  - graphing linear functions
  - deriving equations from graphs and tables
  - solving simulations equations algebraically and graphically
  - the best line of fit graphically and determine equation
- mathematical computations involving polynomials encompassing:
  - adding, subtracting and multiplying polynomials
  - factorising trinomials
  - solving quadratic equation
- mathematical computations involving quadratic graphs encompassing:
  - graphs of quadratic functions
  - maxima and minima
  - graphical solutions of quadratic equations
  - properties of a parabola
  - applications of parabolas in engineering applications
- trigonometry and graphical techniques in engineering outcomes encompassing:
  - graphs of trigonometric functions e.g.: V=VmsinV,I=Imcos
  - addition of equations such as: vsinA + usin(+) graphically
  - Simpson's Rule to determine the average and root mean square values of a sinusoidal waveform
- statistical data presentation encompassing:
  - appropriate presentation of frequency tables, histograms, polygons, stem and leaf plots
  - advantages of different visual presentations
- appropriate sampling techniques for gathering data encompassing:

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    - design of surveys and census
    - sample data using correct technique
- use of the measures of central tendency encompassing:
    - estimation of percentiles and deciles from cumulative frequency polygons (ogives)
    - interpreting data from tables and graphs, including interpolation and extrapolation
    - analysing misleading graphs
- measures of dispersion in statistical presentations encompassing:
    - box-and-whisker graphs
    - measures of dispersion using variance and standard deviation
    - standardised scores, including Z-scores
- correlation and regression techniques encompassing:
    - interpreting scatter plots
    - correlation coefficients
    - calculate the regression equation and use for prediction purposes
- elementary probability theory encompassing:
    - probabilities in everyday situations
    - counting techniques: factorials; permutations and combinations
- Paschal's triangle and the normal curve encompassing:
    - Paschal's triangle
    - characteristics of the normal curve
    - standard deviation and applications to everyday occurrences
    - probabilities using the normal curve
- differential calculus encompassing:
    - basic concepts - definition of the derivative of a function as the slope of a tangent line (the gradient of a curve); limits; basic examples from 1st principles; notation and results of derivative of k.f(ax + b) where f(x)=x to the power of n, sin x, cos x, tan x, e to the power of x, ln x
    - rules - derivative of sum and difference; product rule; quotient rule; chain rule (function of a function), limited to two rules for any given function
    - the 2nd derivative
    - application - equations of tangents and normals; stationary points; turning points; and curve sketching; rates of change and rectilinear motion
    - verbally formulated problems involving related rates and maxima: minima
- integral calculus encompassing:
    - integration as the inverse operation to differentiation - results of the integral of k.f(ax + b) where f(x) = x to the power of n, sin x, cos x, sec squared x, e to the power of x
    - the method of substitution
    - the definite integral
    - applications - areas between curves; rectilinear motion, including displacement from acceleration and distance travelled; and voltage and current relationship in capacitors and inductors

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- differential equations encompassing:
  - first order and separable linear equations
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices when undertaking computations in an energy sector environment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0049 Use advanced computational processes to provide solutions to energy sector engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use advanced computational processes to provide solutions to energy sector engineering problems.

It includes providing solutions to energy sector engineering problems, applying problem-solving techniques, using a range of advanced mathematical processes, providing solutions to problems and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0039 Provide solutions to basic engineering computational problems

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Provide solutions to engineering problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of problems are obtained from documentation and/or work instruction to solve problems
	1.3	Problems are documented and/or provided in diagrammatic form and appropriate methods identified to resolve them
	1.4	Constants and variables to problems are obtained from measured values and/or problem documentation
	1.5	Alternative methods for resolving problems are reviewed and, as required, discussed with relevant person/s
	1.6	Problems are resolved using mathematical processes in accordance with workplace procedures
2 Complete work and documentation	**2.1**	Justification for solutions used to solve engineering problems is documented in work records in accordance with workplace procedures and relevant industry standards
	2.2	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Engineering diagnosis development and work functions must include at least the following:

- working safety
- applying problem-solving techniques
- using a range of advanced mathematical processes
- provision of electrical/electronic engineering problems solutions
- solutions justification

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEE127A Use advanced computational processes to provide solutions to energy sector engineering problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0049 Use advanced computational processes to provide solutions to energy sector engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- completing work and documenting problem-solving activities
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- documenting justification of solutions provided
- obtaining known constants and variables
- providing computational solutions to energy sector engineering problems
- solving problems using appropriate mathematical processes
- stating problems in written and diagrammatic form.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant advanced engineering mathematics, including:
  - differential calculus
  - differential equations
  - integral calculus
  - linear algebra
  - number
  - sequences and series
  - statistics

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  - variables
  - vectors
- relevant constants and variables
- relevant diagrammatic form
- relevant industry standards
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instruction, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to using advanced computational processes for energy sector engineering problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0050 Use and maintain the integrity of a portable gas detection device

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Duplicate content in Knowledge Evidence removed and typographic errors fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to ensure a workplace, including hazardous areas, is safe from dangerous gases and/or vapours by using and maintaining a portable gas detection device.

Portable gas detection devices are used to detect combustible, flammable and toxic gases and/or vapours in a work area. Portable gas detectors transmit warnings via audible and visible signals, such as alarms and flashing lights, when dangerous levels of gas and/or vapours are detected.

Hazardous areas are defined as areas where fire or explosion may occur due to flammable gases, vapours, combustible dusts and/or ignitable fibres are present in the air, in quantities sufficient to produce explosive or ignitable mixtures.

Competency in this unit requires the ability to use measuring instruments such as portable gas detection devices, establish the safety of an area, monitor dangerous gases and/or vapours, follow workplace procedures in maintaining gas detection devices and completing all required documentation. Individuals will typically work, under supervision, as part of a hazardous area maintenance and repair team.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to use portable gas detection device	**1.1** WHS/OHS policies and procedures for work in hazardous areas are identified and applied
	1.2 Safety processes, relevant permits and material safety data sheet (MSDS)/safety data sheet (SDS) and safe work method statements (SWMS) related to entering a hazardous area are obtained in accordance with workplace procedures and clearance to undertake work is obtained from supervisor
	1.3 Emergency and evacuation plans are reviewed prior to entering hazardous area
	1.4 Gas and/or vapour is identified in accordance with workplace procedures from plant and/or site records and in consultation with relevant person/s
	1.5 Portable gas detection device is checked for calibration and response in accordance with manufacturer instructions and workplace procedures
	1.6 Portable gas detection device is checked for damaged casing from use of incorrect batteries and/or chargers and use of incorrect spare parts and accessories which would nullify its Ex rating
2 Establish safety of area	**2.1** WHS/OHS policies and procedures relating to gas/vapour detection are followed
	2.2 Hazards are monitored and risk controls are implemented in accordance with workplace procedures

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	2.3	Personal protective equipment (PPE) is worn for work in potentially dangerous atmospheres and/or hazardous areas
	2.4	Portable gas detection device is used in accordance with manufacturer instructions and workplace procedures
	2.5	Environmental impacts of gas and/or vapour readings in hazardous areas are taken into consideration when using a portable gas detection device
	2.6	Gas detection readings are recorded in accordance with workplace procedures
	2.7	Safe to work is determined from gas detection reading and then clearance to start or resume work is issued in accordance with workplace procedures
3 Provide training in using portable gas detection devices	**3.1**	Monitoring schedule for detecting dangerous gas and/or vapours in hazardous areas is implemented in accordance with workplace procedures
	3.2	Training is provided to relevant person/s in the use of portable gas detection devices, as required
	3.3	Documentation on training provided is maintained in accordance with workplace procedures
4 Maintain portable gas detection devices	**4.1**	Portable gas detection devices are stored and maintained in accordance with workplace procedures and manufacturer recommendations
	4.2	Gas detection devices are checked and calibrated regularly in accordance with workplace procedures, hazardous area requirements and manufacturer instructions
	4.3	Calibration records of portable gas detection device are maintained in accordance with the workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Using and maintaining portable gas detecting devices must include:	• at least two of the following classified hazardous areas:
	  • confined spaces
	  • drains
	  • pits
	  • excavations

Unit Mapping Information

This unit replaces and is equivalent to UEENEEM076A Use and maintain the integrity of a portable gas detection device.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0050 Use and maintain the integrity of a portable gas detection device

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Duplicate content in Knowledge Evidence removed and typographic errors fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - applying safe work practices
  - determining safety of area
  - identifying and monitoring hazards
  - implementing risk control measures
  - using material data safety sheets (MSDS)/safety data sheets (SDS) and safe work method statements (SWMS)
  - wearing personal protective equipment (PPE)
- following workplace procedures to maintain gas detection devices
- interpreting manufacturer specifications
- meeting workplace compliance requirements
- preparing to use portable gas detection devices
- using and maintaining the integrity of portable gas detection devices, including:
  - determining whether gas/vapour level in a work area is safe from explosive, toxic and oxygen deficiency
  - following work permits and clearance procedures
  - following workplace procedures to maintain integrity of gas detection devices
  - instructing others in use of a portable gas detection devices
  - monitoring hazards and following evacuation procedures
- using portable gas detection devices to monitor gases and/or vapours
- using site-specific documentation, including plans, records and schedules
- utilising relevant equipment and tools.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- actions or conditions that would void hazardous area/equipment protections
- characteristics and liabilities of equipment and tools
- principles of gas detection and the use and care of portable gas detection devices, including:
  - fundamental principles in the use of gas and vapour instruments
  - use of manufacturer instruction manuals (operating instructions, adjustment procedures, operational limitations and storage)
  - calibration and response checking
- detecting gases and vapours, including:
  - apparatus capability and users' knowledge of gases and vapours
  - common properties of gases and vapours, including density of gases, complication of evaporation, condensation and temperature effects of vapours and their mixtures; effect of temperature on density; lower explosive limit (LEL) and upper explosive limit (UEL) of combustibles and toxicity
  - detection and non-detection of gases
  - environmental effects and intended application
  - propagation of gases, including the release of gas and vapours, ventilation, density, temperature and location
  - safety when monitoring for flammable gases where personnel could be present
  - the differences between detecting gases and vapours, including added complication of evaporation, condensation and temperature effects of vapours and their effect on propagation, calibration and detection, including sampling
- oxygen deficiency and effects on safety, including:
  - chemical reaction of oxygen with solid and gaseous products
  - dilution of the air by displacement by some other gas or vapour
- measuring principles of catalytic sensors, electrochemical sensors, infrared sensors and semi-conductor sensors, including:
  - common applications, limitations and safety
  - interferences of other gases with the measurement
  - poisoning of the sensor
    - note: detailed information on gas detection is given in AS/NZS 60079.29.2 Explosive atmospheres Gas detectors - Performance requirements of detectors for flammable gases
- limits of gas detection of flammable (combustible) gas equipment, including:
  - limit to which flammable gas detection equipment will only detect gases and vapours that are present in the vicinity of the detector or in the line of sight of open path apparatus
  - limit to which flammable gas equipment will not detect combustible liquids and not detect

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combustible liquids as such, or combustible mists, dusts or fibres

- limits of vapour detection of flammable (combustible) gas equipment (flammable gas detection equipment will only detect those vapours that do not condense at the temperature of the detector or its sampling equipment)
- interpretation of gas detection instrument readings (behaviour), including:
  - upscale reading in the presence of a gas for which an instrument is not calibrated
  - causes of erratic indications
  - reading of low concentrations of gas of interest
  - off-scale readings
- toxicity level of flammable gases and vapours and their potential for occurring in a given situation
- issues with gas and vapour detection in hazardous areas which may include confined spaces
- manufacturer instruction manuals (operating instructions, adjustment procedures, operational limitations and storage)
- relevant hazardous area classification principles and techniques, including calibration and response checking
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures for testing and inspection of electrical equipment in hazardous atmospheres
- environmental conditions that may impact explosion-protection techniques
- flammable material properties and ignition characteristics.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment

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specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use drawings, diagrams, cable schedules, industry standards, codes of practice and specifications as they apply to various electrotechnology work functions.

It includes interpreting schematic, wiring and mechanical diagrams, equipment and cable/connection schedules and manuals; and the use and format of compliance standards, codes and job specifications used in the electrotechnology industry. It also includes the use of site and architectural drawings/plans to show the location of services, apparatus, plant and machinery.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to use drawings, diagrams, schedules and manuals	**1.1** Hazards are identified, risks are assessed and control measures are implemented

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	1.2	Need for drawings, diagrams, schedules or manuals is determined from the nature of work to be undertaken
	1.3	Relevant drawings, diagrams, site plans and cable/connection schedules or manuals required for the work to be undertaken are determined and obtained in accordance with workplace procedures
2 Use drawings, diagrams, schedules and manuals to obtain job information	**2.1**	Drawings, diagrams and cable/connection schedules are interpreted using drawing layouts, conventions and symbols
	2.2	Dimensions are extracted from drawings and diagrams in accordance with workplace procedures for application to the work to be undertaken
	2.3	Location of equipment is determined from equipment cable/connection schedules and location diagrams
	2.4	Information relating to work to be undertaken is located and interpreted from relevant cable/connection manuals in accordance with workplace procedures
3 Use drawings, diagrams, schedules and manuals to convey information and ideas	**3.1**	Drawing conventions are applied in neat and legible freehand drawings to convey information and ideas to person/s involved in the work to be undertaken
	3.2	Drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement in accordance with workplace procedures
	3.3	Corrected drawings are forwarded to appropriate person/s in accordance with workplace procedures
4 Comply with industry standards, codes of practice and specifications	**4.1**	Industry standards and codes of practice that specifically apply to relevant disciplines are obtained in accordance with workplace procedures
	4.2	Format of industry standards and codes of practice that apply to relevant disciplines are reviewed and applied in accordance with workplace procedures
	4.3	Purpose, format and content of job specifications are reviewed and applied

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Using drawings, diagrams, schedules, standards, codes and specifications must include:	• assembly, installation, fault finding, maintenance or development work functions in the electrotechnology industry

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards
  - implementing and monitoring control measures
- dealing with unplanned events in accordance with workplace procedures
- extracting dimensions from drawings and diagrams
- reading and interpreting drawings, diagrams and plans to determine the location of electrical/communication/audio accessories and appliances
- using drawings, diagrams, cable/connection schedules, industry standards, codes of practice and specifications used in electrotechnology work, including:
  - giving correct information in freehand drawings
  - identifying and selecting drawings, diagrams, site plans, cable/connection schedules and manuals relevant to the work to be undertaken
  - interpreting drawings, diagrams, cable/connection schedules and manuals correctly
  - obtaining compliance standards and codes applicable to particular disciplines
  - reviewing and understanding the format of compliance standards and codes that apply to particular disciplines
  - reviewing the format and content of typical job specifications
  - using correct conventions in freehand drawings
- sketching and marking up basic circuit diagrams
- developing switching charts to identify the terminals of various types of switches
- using drawings, diagrams, schedules and manuals to:
  - connect equipment
  - convey information and ideas
  - obtain job information.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- architectural drawings, including:
  - site plans, floor plans detailed drawings and standard drawings
  - architectural floor plans to determine the power and lighting or communications/audio/video layouts required in a domestic installation
  - site plans to locate the service point, consumer mains, communication services, main switchboard, distribution boards and/or builders supplies
  - standard drawing scales to determine the actual lengths represented by dimensions on an architectural drawing
  - Australian standard symbols used on floor plans to show the location of the accessories and appliances as detailed in an electrical schedule
- building construction drawings and diagrams, including:
  - building types: timber frame, brick veneer, double brick and metal frame
  - identification of different types of footings, floors, external walls, roofs and interior walls
  - typical cable routes through buildings, structures and premises
  - sequence of each constructional stage for brick, brick veneer and timber cottages
  - identification of the stages at which the electrical/communications - first and second fixing occurs in the constructional sequence
  - areas of cooperation between electrical/communications and other building trades
- circuit diagrams, including:
  - purpose of circuit diagrams in the electrotechnology industry
  - conventions used in and the features of circuit diagrams
  - common symbols used in circuit diagram
- electrical drawings, including:
  - types of electrical drawings: block, circuit, wiring and ladder diagrams
  - purpose and application of block, circuit, wiring diagrams and ladder diagrams
  - Australian standard symbols used to represent components on electrical diagrams
  - converting a circuit diagram to a wiring diagram
  - identification of cable type, origin and route from a cable schedule
  - developing a cable schedule for a given installation
- purpose, format and content of typical job specifications, including common templates on which job specifications are written
- regulations for undertaking electrical work, including legislative requirements for ensuring electrical or electronic equipment is safe i.e. compliance requirements of electrical installations
- scope of work covered by licensing in the electrotechnology industry (electrical licensing)
  - legislative requirements for ensuring electrical or electronic equipment is safe, including compliance requirements of electrical installations

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- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures include risk mitigation process
- standards philosophy and format, including:
  - performance verses prescriptive requirements
  - purpose of technical standards and their development
  - role of Standards Australia/New Zealand, International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
  - how standards are used in compulsory and accreditation compliance schemes
  - arrangement and use of technical standards in relation to electrical and electronic work
  - how to read and apply a standard
  - standards and codes that apply to all types of electrical installations
  - standards mandated under regulation (e.g. Wiring Rules) or by an authority, deemed-to-comply standard and local service requirements (e.g. service rules)
  - codes applicable to electrical safe working practices and some aspects of the Building Code of Australia (BCA)
- wiring diagrams, including:
  - purpose of wiring diagrams in the electrotechnology industry
  - conventions used in and the features of wiring diagrams
  - common symbols used in wiring diagrams.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0052 Use routine equipment/plant/technologies in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use routine equipment, plant, technologies and personnel protective equipment (PPE) in an energy sector environment.

It includes preparing and using equipment, plant, technologies and PPE, and completing workplace requirements in an energy sector work environment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to use equipment, plant and technologies	**1.1** Work instructions in the use of equipment, plant or technologies are obtained, interpeted and followed
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are identified, communicated and confirmed to ensure they

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		are applied in the carrying out of work activities in an energy sector environment
	1.3	Tools, equipment and PPE necessary for work are identified, scheduled and checked to ensure they work correctly and are safe to use in accordance with workplace procedures
	1.4	Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.5	Resources and materials needed for work are confirmed, scheduled and obtained in accordance with workplace procedures
	1.6	Schedule of work, including practices for working safely, are confirmed in accordance with workplace instructions and requirements
2 Use equipment, plant and technologies	**2.1**	WHS/OHS policies and workplace procedures for safe work practices are followed to eliminate or minimise incidents
	2.2	Equipment, plant or technologies are used in accordance with schedule of work to ensure work is completed in agreed timelines, to required quality standard and with a minimum of waste
	2.3	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.4	Regular checks of work quality are undertaken in accordance with work instructions and job requirements
3 Complete use of equipment, plant and technologies	**3.1**	Regular checks are made to ensure the safe use of equipment, plant or technologies in accordance with job instructions and requirements
	3.2	Relevant person/s is notified of work completion using equipment, plant or technologies
	3.3	Tools, equipment and surplus resources and materials are appropriately cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Work area is cleaned, made safe and sustainable energy practices are followed

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3.5 Workplace record/s are updated in accordance with work instructions and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE141A Use of routine equipment/plant/technologies in an energy sector environment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0052 Use routine equipment/plant/technologies in an energy sector environment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying risk control measures
- following workplace procedures and instruction
- applying sustainable energy principles and practices
- completing workplace documentation
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- maintaining a clean worksite and equipment
- preparing and using equipment, plant and technologies, including:
  - completing schedule of work
  - using and returning tools, equipment, personnel protective equipment, surplus resources and materials
  - updating work records.
-

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical concepts, including:
  - electrical supply and distribution within a building or premises
  - arrangement of circuits
  - protection for safety requirements and their practice
  - difference between alternating current (a.c.) and direct current (d.c.)
  - measurement and calculation of voltage, current, resistance and power in practical circuits
  - concepts and applications of magnetism and electromagnetic induction

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  - transformer operating principles and their application
  - hazards associated with electrical systems and apparatus
- energy sector tools, equipment and technology
- relevant energy sector industry standards
- relevant manufacturer specifications
- operating instruction for tools, equipment and technologies
- relevant job safety assessments or risk mitigation processes
- relevant sustainable energy practices
- relevant WHS/ OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0053 Write specifications for computer systems engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for computer systems engineering projects.

It includes preparing specifications to meet client expectations, consulting with relevant person/s and/or information sources, and documenting design with approval of relevant person/s.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for specification writing are reviewed and

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		applied in accordance with workplace procedures
	1.3	Scope of the specification is determined using formal evaluation/survey processes
	1.4	Criteria from related works impacting specification are determined from relevant documentation, site visits and/or discussions with relevant person/s
2 Write specification	**2.1**	Specification is developed with scenarios/requirements in consultation with relevant person/s and in accordance with relevant industry standards
	2.2	Specification is developed in collaboration with relevant design professionals and contractors involved in the project
	2.3	Relevant person/s required for the project is identified and their roles specified in accordance with specification scope
	2.4	Specification is reviewed in accordance with specification scope inputs and adjusted to rectify anomalies
	2.5	Specification is developed in accordance with workplace procedures
3 Obtain approval of specification	**3.1**	Specification is presented and discussed with relevant person/s
	3.2	Alterations to the specification resulting from the discussion are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing specifications for medium-sized computer systems engineering project must include all the following attributes:	• safety requirements met • client expectations established • cost-effective solutions pursued and assured • design and technical requirements documented

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE070B Write specifications for computer systems engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0053 Write specifications for computer systems engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- determining scope and parameters of the specification
- determining the impact of related works
- developing specification in accordance with workplace procedures
- developing specification with scenarios and requirements
- identifying competencies required for the specification
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- preparing specification requirements
- reviewing specifications in accordance with specification scope inputs and adjusted to rectify anomalies
- writing specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- computer systems engineering specifications
- computers functions
- relevant industry documentation
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- specification writing techniques.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment and currently used in industry
- resources that reflect current industry practices in relation to writing specifications for computer systems engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0054 Write specifications for electronics and communications engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for electronics and communications engineering projects.

It includes preparing specification to meet client expectations, consulting with relevant person/s and/or information sources and documenting design with approval of relevant person/s.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for specification writing are reviewed and

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		applied in accordance with workplace procedures
	1.3	Scope of the specification is determined using formal evaluation/survey processes
	1.4	Criteria from related works impacting specification are determined from relevant documentation, site visits and/or discussions with relevant person/s
2 Write specification	**2.1**	Specification is developed with scenarios/requirements in consultation with relevant person/s in accordance with relevant industry standards
	2.2	Specification is developed in collaboration with relevant design professionals and contractors involved in the project
	2.3	Relevant person/s required for the project is identified and roles specified in accordance with specification scope
	2.4	Specification is reviewed in accordance with specification scope inputs and adjusted to rectify anomalies
	2.5	Specification is developed in accordance with workplace procedures
3 Obtain approval of specification	**3.1**	Specification is presented and discussed with relevant person/s
	3.2	Alterations to the specification resulting from discussions are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing a specification for medium-sized electronics and communications engineering project must include at least one of the following attributes:

- safety requirements met
- client expectations established
- cost-effective solutions pursued and assured
- design and technical requirements documented

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE072B Write specifications for electronics and communications engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0054 Write specifications for electronics and communications engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope and parameters of the specification
- determining the impact of other related works
- developing the specification incorporating scenarios and all requirements
- identifying competencies required for the specification
- writing specifications
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- developing specification in accordance with workplace procedures
- preparing specification requirements
- reviewing specifications in accordance with specification scope inputs and adjusting to rectify anomalies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronics and communications engineering specification development and writing, including:
  - electronics and communications engineering specifications encompassing:
    - purpose and nature of specification
    - performance-based specifications
    - prescriptive specifications
    - acceptable evidence of compliance
    - additional service required with the supply of equipment

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- suppliers and manufacturers encompassing:
  - documenting specification
  - customer/client relations encompassing:
    - importance of customer/client relations
    - interpersonal skills that enhance customer/client relationships
    - dispute resolution
    - customer/client relations strategies
- basic computer functions encompassing:
  - starting up
  - selecting application
  - entering information
  - saving
  - printing
- research skills encompassing:
  - terminology - terminology used in a research workplace and terminology used in research-specific literature
  - theory – why conduct research - the history of research, past research successes, past research failures, research protocols and research practices
  - the research environment - standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
  - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection and information management system selection
  - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
  - research, development and commercialisation - research and development goals versus commercialisation goals and realities, and research and development to inspire a commercialisation process
- relevant industry and workplace documentation
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to writing specifications for electronics and communications engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0055 Write specifications for industrial electronics and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for industrial electronics and control projects.

It includes determining client expectations, ensuring cost-effective solutions are pursued, and documenting design and technical requirements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for specification writing are reviewed and adopted in accordance with workplace procedures

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	1.3	Scope of industrial electronics and control projects specification is determined using formal evaluation/survey processes
	1.4	Criteria from related works impacting on specification are determined from relevant documentation, site visits and/or in consultation with relevant person/s
2 Write specification	**2.1**	Specification is developed to include scenarios and requirements in consultation with relevant person/s and relevant industry standards
	2.2	Specification is developed in collaboration with relevant design professionals and contractors involved in the project
	2.3	Relevant person/s required for project are identified and roles specified in the specification
	2.4	Specification is reviewed against inputs and adjusted to rectify any anomalies
	2.5	Specification is developed and documented in accordance with workplace procedures
3 Obtain approval of specification	**3.1**	Specification is presented and discussed with relevant person/s
	3.2	Alterations to specification resulting from discussions are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Developing specification must include at least one medium-sized industrial electronics and control project and include at least the following:	• safety requirements met • client expectations established • cost-effective solutions pursued and assured • design and technical requirements documented

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE075B Write specifications for industrial electronics and control projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0055 Write specifications for industrial electronics and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- determining scope of the specification industrial electronics and control projects
- determining the impact of related works.
- developing and documenting specifications
- developing specification in collaboration with relevant person/s
- developing specification incorporating scenarios and requirements
- negotiating alterations to the proposed specification
- obtaining approval of the final specification
- preparing specification requirements
- presenting and discussing specification
- reviewing and adopting techniques for specification writing
- reviewing inputs and rectifying anomalies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant design professionals, suppliers and manufacturers
- relevant industrial electronics and control engineering specifications
- relevant industry standards
- relevant manufacturer specifications
- relevant research skills
- relevant job safety assessments or risk mitigation processes
- relevant specification inputs and anomalies
- relevant specification writing techniques

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to writing specifications for industrial electronics and control engineering projects.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0056 Apply methods to maintain currency of industry developments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply methods to maintain currency of industry developments.

It includes identifying and maintaining currency of methods and practices of industry developments.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify currency of industry developments	**1.1** Work activities are identified and reviewed for currency of methods in accordance with relevant industry standards
	1.2 Information and advice are sought for relevant legislated requirements on work outcomes

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	1.3	Technical information is reviewed in accordance with relevant industry standards
2 Maintain currency of methods and practices	**2.1**	Methods are maintained in accordance with work health and safety (WHS)/occupational health and safety (OHS) requirements
	2.2	Methods are maintained in accordance with relevant industry standards
	2.3	Methods are maintained in accordance with relevant legislation and workplace procedures
	2.4	Methods for maintaining currency of relevant industry developments are identified and applied in accordance with workplace procedures
	2.5	Maintenance of current methods and practices for work is documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE006B Apply methods to maintain currency of industry developments.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0056 Apply methods to maintain currency of industry developments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying methods to maintain currency in accordance with relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- documenting maintenance of current knowledge and practices in accordance with relevant industry standards
- identifying and reviewing areas of work activities for currency
- preparing to apply methods to maintain currency of industry developments
- using methods to ensure managerial aspects of work in accordance with relevant industry standards
- using methods to ensure technical aspects of work are current in accordance with relevant industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- currency of technology, machinery, equipment and tools, applications and uses
- relevant codes of practice and industry standards
- relevant manufacturer specifications and instruction manuals
- relevant methods of formally maintaining currency
- relevant regulatory and industry standards
- relevant requirements to maintain currency in industry practices and products
- relevant job safety assessments or risk mitigation processes
- relevant sources of information in industry changes and new developments
- relevant technical information

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - industry journals
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to applying methods to maintain currency of industry developments
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0057 Manage electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage an electrotechnology project.

It includes determining scope, managing an electrotechnology project and completing reporting/documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine scope of the electrotechnology project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for relevant work area are identified and applied
	1.2 Project deliverables and budget are determined from relevant documentation and discussions with appropriate person/s

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	1.3	Measurable outcomes to evaluate the electrotechnology project are identified from relevant documentation
	1.4	Resources needed to meet project outcomes are identified from relevant documentation
	1.5	Processes and procedures are developed for managing contract variations from discussions with relevant person/s and in accordance with contract
2 Manage the implementation of an electrotechnology project	**2.1**	WHS/OHS policies and procedures are implemented and monitored
	2.2	Project tasks are delegated to competent project person/s
	2.3	Project risks are identified, assessed and strategies implemented to ensure outcomes are achieved to relevant industry standards specified in the contract and in accordance with workplace procedures
	2.4	Procurement is monitored to ensure on-time supply of plant and materials in accordance with project plan and workplace procedures
	2.5	Verification of project technical design, modification, installation and/or maintenance of system and equipment parameters is completed against specifications and workplace procedures
	2.6	Project progress is monitored against schedule, quality requirements and budget
	2.7	Project/worksite conflicts are identified and managed in accordance with workplace procedures
	2.8	Variations in project are managed in accordance with agreed processes and the contract
	2.9	Project records are maintained and progress reports completed and provided to appropriate person/s
3 Complete electrotechnology project	**3.1**	Project outcomes are reviewed against project plan, risk strategies, contract variations, safety performance and budget
	3.2	Acceptance of project completion is sought from appropriate person/s and handover conducted in accordance with workplace policies and procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Managing electrotechnology projects must include the following:	• design
	• modifications
	• installation
	• maintenance of systems and equipment
	• management of:
	  • WHS/OHS
	  • budget
	  • variations
	  • personnel
	  • resources and critical path timelines
	  • progress monitoring
	  • completion documentation

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE012B Manage electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0057 Manage electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope of the project accurately
- ascertaining the input of a project
- developing effective management processes
- managing resources and variations effectively
- resolving conflicts
- adopting risk management strategies
- maintaining records and submitting progress reports
- meeting project outcomes
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices
- completing and acquitting the project
- identifying electrotechnology project risks and implementing control measures
- implementing workplace policies and procedures, including:
  - project scope and quality
  - project budget/finances
  - equipment and resources
  - human resources
  - communication with personnel, contractors, stakeholders and clients.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrotechnology project management concepts and customer/client relations, including:
  - defining project parameters:

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    - project scope
    - project stakeholders and clients
    - project phases and the relationship between phases
    - time requirements and limitations
    - resource requirements and limitations
    - quality requirements and limitations
- time management:
    - time management concepts
    - standard practices for ensuring a project runs to time
- financial management:
    - financial management concepts
    - standard practices for managing project finances
    - project budgets
    - costs, variations and estimations
    - invoicing against project phases/deliverables
    - acquittals
- quality management:
    - quality management concepts
    - standard practices for managing quality within a project
- human resource management:
    - human resource management concepts
    - standard practices for managing personnel within a project
- communication management:
    - communication management concepts
    - standard practices for managing communication within a project
- risk management and contingencies:
    - risk management concepts
    - standard practices for managing risk within a project
    - internal risks, external risks, risk minimisation, risk removal and contingencies
- procurement management:
    - procurement management concepts
    - standard practices for managing procurement
- physical resource management:
    - types of physical resources, including equipment, technology, information and facilities
    - physical resource management concepts
    - standard practices for managing physical resources
- contracts:
    - understanding project contracts
    - standard practices for working to contract specifications

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    - contract format
    - contract content
    - legal obligations of contract parties
    - accompanying documentation, including contract schedules
  - performance assessment and continuous improvement:
    - standard performance assessment practices
    - standard continuous improvement practices
  - engineering ethics principles
  - importance of customer/client relations encompassing:
    - interpersonal skills that enhance customer/client
    - dispute resolution
    - customer/client relations strategies
- project management principles
- relevant legislation/regulation, including relevant WHS/OHS legislated requirements
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to managing electrotechnology projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0058 Observe safety practices are followed in the vicinity of isolated electrical cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to observe safety practices are followed in the vicinity of isolated electrical cables.

It includes preparing and observing safety practices whilst taking actions to mitigate risks when working near isolated cables/conductors designed to operate above extra-low voltage (ELV). It also includes identifying electrical hazards and consequences of damage to cables and electrical infrastructure, applying safe working methods, identifying hazards, evaluating risks, adapting safe work methods and documenting safety activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to observe safety practices	**1.1** Extent of work is determined from job instructions, design brief and other relevant documentation

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		1.2	Electrical cables in the work area are located and identified and authorisation received from relevant person/s
		1.3	Access permit is obtained, read and applied from authorised switching officer and electrical supply is isolated
		1.4	Safe workplace procedures for plant, machinery and equipment are reviewed and applied
2	**Observe safety practices**	**2.1**	Work is observed to ensure safe working methods are followed in accordance with workplace procedures
		2.2	Work area near isolated electrical cables is observed to ensure it is not damaged or disturbed
		2.3	Unplanned events are responded to in accordance with workplace procedures
3	**Take actions to mitigate risk**	**3.1**	Hazards not previously identified are referred to relevant person/s for risk mitigation measures in accordance with workplace procedures
		3.2	Hazards are identified, risks assessed and control measures implemented
		3.3	Solutions used to solve problems are justified and documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Observing safety practices are followed in the vicinity of isolated electrical cables normally operating above ELV must include each of the following situations:	• cables installed underground in ducts or buried direct • bare and insulated overhead conductors/cables • cables installed above ground, unenclosed or

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enclosed in conduit, trunking or ducts

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE152A Observe safety practices are followed in the vicinity of isolated electrical cables.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0058 Observe safety practices are followed in the vicinity of isolated electrical cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- reading instructions and understanding the nature of the work to be undertaken
- understanding the location of electrical cables in the vicinity of the work to be undertaken
- receiving, reading and understanding access permits
- reviewing and understanding safe working methods for the plant, machinery and equipment to be used
- observing work activities ensuring safe working methods are followed
- dealing with previously unidentified hazards in accordance with established procedures
- monitoring risk mitigation methods for continuous improvement in accordance with established procedures
- documenting safe working practices and any corrective actions in accordance with established procedures
- dealing effectively with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including taking actions to mitigate risk
- implementing risk control measures
- observing safety practices are followed around isolated electrical cables
- preparing and observing safety practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safety practices - working safely around electrical cables and infrastructure, including:
  - effects of electric shock on the human body encompassing:
    - shock currents
    - burns
    - risks of low voltage (LV), high voltage (HV) and high currents

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- risk management and assessment of risk encompassing:
  - principle and purpose of risk management
  - processes for conducting a risk assessment
- hazards associated with electrical cables/conductors encompassing:
  - electrical supply arrangements for isolation of circuits
  - supply connected
  - capacitance charge on cables isolated from supply
- consequences of damaged cables/conductors encompassing:
  - accelerated deterioration of insulated cables, including damage to enclosures, serving, armours, sheathing and insulation without exposure of the conductors
  - damage of exposing conductors with the likelihood of dangerous step voltage and touch voltage
  - how a short circuit occurs and the resulting potential damage they cause
- risks and control measures associated with work in the vicinity of electrical cables and infrastructure
- the main features and purpose of an access permit system
- electrical isolation and types of permits issued for work in the vicinity of isolated cables
- scope of work permitted on an access permit
- safety observation procedures
- relevant industry standards for electrical isolation
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0059 Write specifications for electrical engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for electrical engineering projects.

It includes preparing, writing specifications and obtaining approval for electrical engineering projects.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for specification writing are reviewed and applied in accordance with workplace procedures

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	1.3	Relevant person/s is consulted and/or site visits conducted to identify other works impacting on specification
2 Write specification	**2.1**	Specification is developed to include scenarios/requirements in consultation with relevant person/s and in accordance with relevant industry standards
	2.2	Specification is developed in collaboration with relevant design professional/s and/or contractor/s involved in the project
	2.3	Relevant person/s required for the project is identified and their role/s specified in the specification
	2.4	Specification is reviewed against all inputs and adjusted to rectify any anomalies
	2.5	Specification is developed in accordance with workplace procedures
3 Obtain approval of specification	**3.1**	Specification is presented and discussed with relevant person/s
	3.2	Alterations to the specification resulting from the discussion are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing specifications must include at least one medium-sized electrical engineering	• safety requirements met • client expectations established • cost-effective solutions pursued and assured

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project with the following attributes:

- design and technical requirements documented

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE071B Write specifications for electrical engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0059 Write specifications for electrical engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope and parameters of the specification
- determining the impact of other related works
- developing the specification incorporating scenarios and all requirements
- identifying competencies required for the specification
- writing specifications
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- establishing the specification using formal evaluations/surveys
- preparing specification requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical engineering specification development and writing, including:
  - electrical engineering specifications encompassing:
    - purpose and nature of specification
    - performance-based specifications
    - prescriptive specifications
    - acceptable evidence of compliance
    - additional service required with the supply of equipment
  - dealing with suppliers and manufacturers encompassing:
    - documenting specification

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    - customer/client relations encompassing:
        - importance of customer/client relations
        - interpersonal skills that enhance customer/client relationships
        - dispute resolution
        - customer/client relations strategies
- basic computer functions encompassing:
    - starting up
    - selecting application
    - entering information
    - saving
    - printing
- research skills encompassing:
    - terminology - terminology used in a research workplace and terminology used in research-specific literature
    - theory – why conduct research - the history of research, past research successes, past research failures, research protocols and research practices
    - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
    - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection and information management system selection
    - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
    - research, development and commercialisation - research and development goals versus commercialisation goals and realities; research and development to inspire a commercialisation process
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant scenarios/requirements
- relevant techniques for specification writing
- relevant WHS/OHS legislated requirements
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools and equipment currently used in industry
- resources that reflect current industry practices in relation to writing specifications for electrical engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0060 Write specifications for electrotechnology engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for electrotechnology engineering projects.

It includes preparing and writing specifications for electrotechnology engineering projects. It also includes obtaining approval of final specification.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare engineering specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Engineering techniques for specification writing are reviewed and implemented in accordance with

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		workplace procedures
	1.3	Scope of the engineering specification is identified using a formal evaluation/survey process
	1.4	Related works impacting on the specification are determined from relevant documentation, site visits and/or discussion with relevant person/s
2 Write engineering specification	**2.1**	Engineering specification scenarios/requirements are developed in consultation with relevant person/s in accordance with relevant industry standards
	2.2	Engineering specification is developed in collaboration with relevant design professionals and contractors involved in the project
	2.3	Relevant person/s required for the project is identified and roles specified in the specification
	2.4	Engineering specification is reviewed with inputs and adjusted to rectify any anomalies
	2.5	Engineering specification is developed in accordance with workplace procedures
3 Obtain approval of specification	**3.1**	Engineering specification is presented and discussed with relevant person/s
	3.2	Alterations to the engineering specification are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Developing specifications must include at least one medium-sized electrotechnology engineering project with the following attributes:	• safety requirements met • client expectations established • cost-effective solutions pursued and assured • design and technical requirements documentation

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE084A Write specifications for electrotechnology engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0060 Write specifications for electrotechnology engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope and parameters of the specification
- determining the impact of other related works
- developing the specification incorporating scenarios and all requirements
- identifying competencies required for the specification
- writing specifications
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- identifying roles in specification
- preparing specification requirements
- using a formal evaluation/survey process.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrotechnology engineering specification development and writing, including:
  - engineering specifications encompassing:
    - purpose and nature of specification
    - performance-based specifications
    - prescriptive specifications
    - acceptable evidence of compliance
    - additional service required with the supply of equipment
  - dealing with suppliers and manufacturers encompassing:

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    - documenting specification
    - customer/client relations encompassing:
        - importance of customer/client relations
        - interpersonal skills that enhance customer/client relationships
        - dispute resolution
        - customer/client relations strategies
- basic computer functions encompassing:
    - starting up
    - selecting application
    - entering information
    - saving
    - printing
- research skills encompassing:
    - terminology - terminology used in a research workplace and terminology used in research-specific literature
    - theory – why conduct research - the history of research, past research successes, past research failures, research protocols and research practices
    - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
    - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection and information management system selection
    - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
    - research, development and commercialisation - research and development goals versus commercialisation goals and realities; research and development to inspire a commercialisation process
- relevant design professional/s and contractor/s
- relevant engineering techniques
- relevant evaluation/survey processes
- relevant industry standards
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to writing specifications for electrotechnology engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0061 Write specifications for refrigeration and air conditioning engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for a refrigeration and air conditioning engineering project.

It includes determining refrigeration and air conditioning engineering project specifications, documenting design and technical requirements, and obtaining approval for the project specification.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare refrigeration and air conditioning engineering project specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for relevant work area are identified and applied

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		1.2 Techniques for specification writing are reviewed and adopted in accordance with workplace procedures
		1.3 Scope of the specification is determined using formal evaluation/survey processes
		1.4 Criteria from other related works impacting on the specification are determined from relevant documentation, site visits and/or discussions with relevant person/s
2	**Write refrigeration and air conditioning engineering project specification**	**2.1** Specification is developed to include scenarios/requirements determined in consultation with relevant person/s and regulatory requirements
		2.2 Specification is developed in collaboration with relevant design professionals and contractors involved in the project
		2.3 Competent person/s required for the project is identified and their roles specified in the specification
		2.4 Project specification is reviewed and adjusted to rectify any anomalies
		2.5 Project specification is developed in accordance with workplace procedures
3	**Obtain approval for refrigeration and air conditioning engineering project specification**	**3.1** Project specification is presented and discussed with relevant person/s
		3.2 Alteration/s to project specification resulting from discussions is negotiated with relevant person/s in accordance with workplace procedures
		3.3 Project specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Writing specifications for refrigeration and air conditioning engineering project must include at least the following:	• one medium-sized refrigeration/air conditioning engineering project with the following attributes:
	  • meeting safety requirements
	  • determining client expectations
	  • applying cost-effective solutions
	  • designing and technical documentation requirements

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE073B Write specifications for refrigeration and air conditioning engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0061 Write specifications for refrigeration and air conditioning engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope and parameters of the specification
- determining the impact of other related works
- developing the specification incorporating scenarios and all requirements
- identifying competencies required for the specification
- writing specifications
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- identifying and applying project risk management strategies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigeration and air conditioning engineering specification development, including:
  - refrigeration and air conditioning engineering specifications encompassing:
    - purpose and nature of specification
    - performance-based specifications
    - prescriptive specifications
    - acceptable evidence of compliance
    - additional service required with the supply of equipment
  - dealing with suppliers and manufacturers encompassing:
    - documenting specification

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    - customer/client relations:
        - importance of customer/client relations
        - interpersonal skills that enhance customer/client
        - dispute resolution
        - customer/client relations strategies
- using basic computers functions encompassing:
    - starting up
    - selecting application
    - entering information
    - saving
    - printing
- research skills encompassing:
    - terminology - terminology used in a research workplace and terminology used in research-specific literature
    - theory – reasons for conducting research, the history of research, past research successes, past research failures, research protocols and research practices
    - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
    - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection and information management system selection
    - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
    - research, development and commercialisation - research and development goals versus commercialisation goals and realities, and research and development to inspire a commercialisation process
- project management principles, including:
    - process for amending specifications
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures
- research methodologies.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and facilities currently used in industry
- resources that reflect current industry practices in relation to writing specifications for refrigeration and air conditioning engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0062 Write specifications for renewable energy engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write specifications for a renewable energy (RE) engineering project.

It includes determining RE engineering project specification requirements, documenting design and technical requirements, and obtaining approval for the project specification.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine RE engineering project specification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for relevant work area are identified and applied
	1.2 Techniques for specification writing are reviewed and

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			adopted in accordance with workplace procedures
		1.3	Scope of the specification is determined using formal evaluation/survey processes
		1.4	Criteria from other related works impacting on the specification are determined from other relevant documentation, site visits and/or discussions with relevant person/s
2	**Write RE engineering project specification**	**2.1**	Specification is developed to include scenarios/requirements determined in consultation with relevant person/s and regulatory requirements
		2.2	Specification is developed in collaboration with relevant design professionals and contractors involved in the project
		2.3	Competent person/s required for the project is identified and their role specified in the specification
		2.4	Project specification is reviewed and adjusted to rectify any anomalies
		2.5	Project specification is developed in accordance with workplace procedures
3	**Obtain approval for RE engineering project specification**	**3.1**	Project specification is presented and discussed with relevant person/s
		3.2	Alterations to project specification resulting from discussions are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Project specification is finalised and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Writing specifications for RE engineering projects must include at least the following:	• one medium-sized RE engineering project with the following attributes:
	  • meeting safety requirements
	  • determining client expectations
	  • applying cost-effective solutions
	  • designing and technical documentation requirements

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE074B Write specifications for renewable energy engineering projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0062 Write specifications for renewable energy engineering projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope and parameters of the specification
- determining the impact of other related works
- developing the specification incorporating scenarios and all requirements
- identifying competencies required for the specification
- writing specifications
- negotiating alterations to the proposed specification successfully
- obtaining approval of the final specification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- identifying and applying project risk management strategies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- renewable energy (RE) engineering specification development and writing, including:
  - RE engineering specifications encompassing:
    - purpose and nature of specification
    - performance-based specifications
    - prescriptive specifications
    - acceptable evidence of compliance
    - additional service required with the supply of equipment
  - dealing with suppliers and manufacturers encompassing:
    - documenting specification

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    - customer/client relations encompassing:
        - importance of customer/client relations
        - interpersonal skills that enhance customer/client
        - dispute resolution
        - customer/client relations strategies
- basic computer functions encompassing:
    - starting up
    - selecting application
    - entering information
    - saving
    - printing
- research skills encompassing:
    - terminology - terminology used in a research workplace and terminology used in research-specific literature
    - theory – reasons for research - the history of research, past research successes, past research failures, research protocols and research practices
    - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
    - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection and information management system selection
    - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
    - research, development and commercialisation - research and development goals versus commercialisation goals and realities, and research and development to inspire a commercialisation process
- project management principles
- process for amending specifications
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and facilities currently used in industry
- resources that reflect current industry practice in relation to writing specifications for RE engineering projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECD0063 Write work activity reports

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write work activity reports.

It includes planning, writing and obtaining approval for the final activity report. It also includes an understanding of the energy sector, gathering relevant information from appropriate sources, making deductions from the information obtained, and arranging information in a clear and logical sequence.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan a report	**1.1** Report requests are determined in accordance with workplace procedures
	1.2 Purpose and scope of report is determined in accordance with workplace procedures

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	1.3	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.4	Sources of information for report are identified and obtained in consultation with relevant person/s in accordance with workplace procedures
2 Write activity report	**2.1**	Report is developed in consultation with relevant person/s
	2.2	Report is written to include all relevant information obtained
	2.3	Report is arranged in accordance with workplace procedures, including relevant deductions and recommendations
	2.4	Report is written in accordance with workplace procedures
3 Obtain approval for final report	**3.1**	Report is presented, discussed and authorised by relevant person/s
	3.2	Modifications to report resulting from presentation/discussion with authorised person/s are incorporated in accordance with workplace procedures
	3.3	Final report is presented, and approval obtained from authorised person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Writing a report must include at least three of the following:	• enquiry • situation • investigation

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Each report must include at least one of the following different work activities:	• problem • incident • installation • fault finding/repair • servicing/maintenance • safety

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE185A Write work activity reports.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECD0063 Write work activity reports

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the need for a report
- ascertaining the purpose and scope of a report
- sourcing and obtaining information relevant to a report
- arranging reports in a logical sequence
- writing reports in plain English
- obtaining approval for the report
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- proofreading report prior to presenting report for approval.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- work activity reporting, including:
  - scope of work activity reports encompassing:
    - installation, fault finding/repair, servicing/maintenance and safety work activities
    - reports in response to an enquiry, situation, investigation, problem and incident
  - sources of information:
    - work colleagues, customer/client personnel, standards, specifications and direct experience of the enquiry, situation, investigation, problem or incident that is subject of the report
  - structure of reports encompassing:
    - the description and/or explanation of the subject matter in logical sequence of facts
    - arrangement of content

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  - clear English writing techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0001 Estimate electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to estimate material and labour costs for competitive quotation/tenders for electrotechnology work exceeding $AUD20,000.

It includes reading and understanding job specifications, adjusting for material take-offs, determining labour and site requirements, costing and documenting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine project scope	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented

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	1.3	Extent of the project is determined from design brief specifications, other relevant documentation and discussions with appropriate person/s
	1.4	Estimated completion date is determined from design brief specifications, other relevant documentation and discussions with appropriate person/s
	1.5	Project activities are planned to meet scheduled timeframes in consultation with relevant person/s
2 Estimate electrotechnology project	**2.1**	Material take-offs are determined accurately and checked against job specifications
	2.2	Materials, labour and other costs are determined from relevant workplace documentation
	2.3	Sources and availability of materials and human resources required for the electrotechnology project are determined in accordance with workplace procedures
	2.4	Estimates are checked and revised for accuracy in costing against job specifications in consultation with relevant person/s
	2.5	Unplanned events are responded to in accordance with workplace procedures
3 Document and submit quotation	**3.1**	Project estimates are documented in accordance with workplace procedures
	3.2	Quotation is forwarded to relevant person/s within specified timeframe
	3.3	Quotation documentation is filed in accordance with workplace policies and procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC005B Estimate electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0001 Estimate electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adjusting estimates
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- checking and documenting estimates
- creating, documenting, forwarding and filing quotations
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting and submitting quotations
- estimating completion dates
- estimating electrotechnology project material and labour costs
- estimating electrotechnology projects for a competitive quotation/tender for which the value must exceed $AUD20,000
- identifying risk control measures
- planning extent of projects
- sourcing materials and human resources
- working within timeframes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- contingency
- costing
- design brief and specifications
- documents used in estimating and costing margins
- material take-off methods, including a list of materials with quantities and types of material
- money labour rates method of costing
- life cycle costing analysis

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- project estimates, including quotations and adjustments
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- resources to be quantified and costed
- resource (labour, plant, equipment and materials).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0002 Maintain documentation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and prepare documentation required to record work activities, purchases and expenses obligations.

It includes planning and maintaining documentation typically required in an electrotechnology workplace information system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain documentation	**1.1** Documentation requirements and record management methods are identified, obtained and applied in accordance with workplace procedures
	1.2 Advice is sought from supervisor, as required, to ensure work activity is correctly documented and coordinated with other person/s

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	1.3	Forms required to document work activity are obtained in accordance with workplace procedures
	1.4	Work health and safety (WHS)/occupational health and safety (OHS), risk assessment and control measures are documented in accordance with workplace procedures
2 Maintain documents	**2.1**	Work activities are documented, at the appropriate time and in accordance with workplace procedures
	2.2	Documents are checked for accuracy, clarity and anomalies corrected
	2.3	Appropriate information technology is used to maintain workplace documentation
	2.4	Signatures are obtained by relevant person/s, as required
	2.5	Copies of required documents are forwarded to appropriate person/s in accordance with workplace procedures
	2.6	Unplanned events are referred to supervisor for direction in accordance with workplace procedures.

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit must be demonstrated by:	• maintaining documentation in an electrotechnology organisation information system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC001B Maintain documentation.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0002 Maintain documentation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- dealing with unplanned events in accordance with workplace documentation
- recording and maintaining workplace records using appropriate technology in accordance with workplace information methods
- following workplace record management procedures
- maintaining documentation
- planning documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- computers and applications, including:
  - entering information
  - printing
  - saving
  - selecting application
  - starting up
- relevant risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated work records requirements
- relevant workplace communication methods, including:
  - communicating with customers
  - communicating with personnel
  - communicating with suppliers
  - oral and written communication
- relevant workplace documentation and work activities records, including:

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  - methods for recording and maintaining work records
  - purpose and extent of work activities records
  - regulatory work record requirements
  - types of records for maintaining work activities
- relevant workplace record management policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0003 Manage contract variations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage contract variations.

It includes understanding the specification on which the contracted price is based, identifying contract variations, and negotiating and submitting variations documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify terms of variations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Original scope of work and contract price is obtained from specifications, plans, diagrams and relevant tender

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		submission/acceptance documents
	1.4	Costing and claiming variations are obtained from relevant tender submission/acceptance and contract documents
2 Manage contract variations	**2.1**	Contract variations are determined and documentation issued by the customer representative or relevant person
	2.2	Variations are priced in accordance with workplace procedures
	2.3	Variation approvals are negotiated with relevant person/s and in accordance with workplace procedures
	2.4	Unplanned events are identified and resolution techniques are applied in accordance with workplace procedures
	2.5	Approved variations are submitted for payment in accordance with workplace procedures
	2.6	Variations documents are forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Contracts must include at least the following:

- five variations for electrotechnology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC007B Manage contract variations.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0003 Manage contract variations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- ascertaining the terms of the contract, including:
  - ascertaining arrangements for claiming variations
  - ascertaining work specifications, plans, diagrams and contract price
- dealing with unplanned events in accordance with resolution techniques and workplace procedures
- forwarding variation documentation appropriately
- managing contract variations, including:
  - negotiating contract variation approvals
  - pricing variations in accordance with the contract.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant costing and evaluating estimations
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant specifications, plans and diagrams
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to managing contract variations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0004 Participate in appliance servicing work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in appliance servicing work and competency development activities.

It includes applying workplace policies and procedures in actively participating in appliance servicing work activities and competency development. It also includes observing how appliance servicing work is conducted, identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with appliance servicing workplace	**1.1** Workplace policies and procedures for appliance servicing work activities are identified and applied

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	policies and procedures	
		1.2 Clarification on how particular appliance servicing work is to be carried out and the workplace procedures involved is sought from supervisor/appropriate person/s
		1.3 Unplanned situations are dealt with safely in accordance with workplace policies and procedures and with the approval of authorised person/s in a manner that minimises risk to personnel and equipment
2	**Monitor and respond to competency development plan**	**2.1** Aspects of the appliance servicing competency development plan are confirmed in consultation with appropriate person/s
		2.2 Components of the competency development plan are followed in accordance with workplace procedures
		2.3 Opportunities to practise skills and apply knowledge relative to a particular appliance servicing competency are pursued
		2.4 Assistance is sought from appropriate person/s to overcome difficulties in developing skills and applying knowledge relevant to appliance servicing competency
		2.5 Progress in competency development is self-monitored against the appliance servicing competency development plan and workplace policies and procedures
		2.6 Modifications to the competency development plan are made in consultation with appropriate person/s
		2.7 Obligations are met for periodic and timely reporting of competency development activities
		2.8 Periodic competency development activities report is validated by appropriate person/s in accordance with workplace policies and procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC017B Participate in appliance servicing work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0004 Participate in appliance servicing work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including applying risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and appliance equipment
- identifying and confirming the context, requirements and responsibilities of the competency development or training plan to be met
- identifying and confirming the workplace and regulatory policies, procedures and context applicable to appliance servicing work activities
- periodically reviewing progress of the competency development activities in accordance with workplace requirements
- progressing against periodic or staged evaluative performance events in accordance with workplace requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- reporting periodically the competency development activities in accordance with workplace requirements
- seeking assistance to overcome difficulties in developing competency
- seeking clarification of how particular appliance servicing work is to be carried out and the workplace procedures involved.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- competency development plan or training plan responsibilities
- methods of monitoring and reporting competency development activities
- relevant appliance manufacturer specifications

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant work activities and workplace policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- appliance resources that reflect current industry practices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0005 Participate in business equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in business equipment work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant business equipment industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures with approval of relevant person/s
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant person/s
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge to a relevant competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC013B Participate in business equipment work and competency development activities.

Links

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Assessment Requirements for UEECO0005 Participate in business equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- complying with relevant business equipment industry standards and workplace procedures
- dealing with unplanned situations in accordance with relevant industry standards and workplace procedures and approval of relevant person/s
- identifying and confirming relevant industry standards and workplace procedures
- identifying and confirming the context, requirements and responsibilities of the competency development plan
- identifying and confirming the relevant training organisations
- monitoring and responding to a personal competency development plan
- periodically reviewing progress of the competency development activities
- periodically reporting competency development activities
- seeking assistance to assist in developing competency
- seeking clarification on how work is to be carried out in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise work activities policies and procedures
- methods of monitoring and reporting competency development activities
- relevant manufacturer specifications
- relevant training organisations
- relevant work health and safety (WHS)/occupational health and safety (OHS)legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- responsibilities under a competency development plan.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0006 Participate in computer equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in computer equipment work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant computer equipment industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry and workplace procedures with the approval of relevant person/s
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant persons
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge to a relevant competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC014B Participate in computer equipment work and competency development activities.

Links

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Assessment Requirements for UEECO0006 Participate in computer equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and includes:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- complying with relevant computer equipment industry standards and workplace procedures
- identifying and confirming relevant industry standards and workplace procedures
- monitoring and responding to a personal competency development plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- computer equipment work and competency development activities, including:

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- responsibilities under a competency development plan:
  - competency development (training) plans encompassing:
    - state/territory requirements (Acts/regulations)
    - competency development (training) contracts
    - competency development (training) period
    - purpose of competency development (training) plans
    - process in developing competency development (training) plans
    - parties involved in the competency development (training) plan
  - qualification structure encompassing:
    - scope of work
    - Training Packages – UEE Electrotechnology
    - units of competency
    - structure of qualification
    - off-the-job requirements
    - on-the-job requirements
  - responsibilities of parties to the contract encompassing:
    - employer responsibilities
    - learner responsibilities
    - RTO responsibilities
    - State/Territory Training Authorities (STAs)
  - electrotechnology industry career opportunities encompassing:
    - industry areas
    - qualification levels
    - career paths
    - industry customs and practices encompassing:
      - industry bodies – employer and employee representatives
      - regulatory bodies – including licensing/registration, WHS/OHS, industrial relations (IR), training authorities – apprentice/trainee regulation
      - vocational education and training (VET) system – Australian Qualification Framework (AQF) and credentials
    - monitoring of workplace evidence encompassing:
      - workplace exposure and practices and relationship with units of competency
      - methods of collecting workplace evidence
      - monitoring period cycle
      - requirements of workplace evidence
      - actions taken for unsatisfactory progression
      - role of STA
      - apprentice/learner responsibilities
      - employer responsibilities
    - RTO policies encompassing:

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    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties apprentice/learner responsibilities
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belonging
    - dress regulations
    - rotating machinery
    - designated fire and emergency exists
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms
- RTO tour encompassing:
    - RTO layout
    - building layout

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    - tour of building and RTO
  - methods of monitoring and reporting competency development activities encompassing:
    - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
    - industry requirements for monitoring workplace evidence
    - acceptable methods for monitoring and reporting workplace activities
    - apprentice's/learner's responsibility to participate in the reporting of workplace activities
    - RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
    - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
    - options for appeal or assistance from RTO or STA
  - enterprise work activities policies and procedures encompassing:
    - need for policies and procedures
    - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
    - following work activities procedures
- relevant training organisations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and

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following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0007 Participate in electronics and communications work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in electronics and communications work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant electronics and communications industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry and workplace procedures and with the approval of relevant person/s
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant person/s
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge relative to a particular competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC021B Participate in electronics and communications work and competency development activities.

Links

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Assessment Requirements for UEECO0007 Participate in electronics and communications work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- complying with relevant electronics and communications industry standards and workplace procedures
- dealing with unplanned situations in accordance with relevant industry standards and workplace procedures and approval of relevant person/s
- identifying and confirming relevant industry standards and workplace procedures
- identifying and confirming the context, requirements and responsibilities of the competency development plan
- identifying and confirming the relevant training organisations
- monitoring and responding to a personal competency development plan
- periodically reviewing progress of the competency development activities
- reporting periodically competency development activities
- seeking assistance to assist in developing competency
- seeking clarification of how work is to be carried out in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise work activities policies and procedures
- methods of monitoring and reporting competency development activities
- relevant industry bodies, customs and practices
- relevant manufacturer specifications
- relevant training organisations
- relevant work health and safety (WHS)/occupational health and safety (OHS)legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- responsibilities under a competency development plan.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0008 Participate in fire protection control work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in fire protection control work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant fire protection control industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures with approval of relevant person/s
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant person/s
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge to a relevant competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC022B Participate in fire protection control work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0008 Participate in fire protection control work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- identifying, confirming and complying with relevant industry standards and workplace procedures
- monitoring and responding to a personal competency development plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- fire protection control work competency development activities, including:

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- responsibilities under a competency development plan:
  - competency development (training) plans encompassing:
    - state/territory requirements (Acts/regulations)
    - competency development (training) contracts
    - competency development (training) period
    - purpose of competency development (training) plans
    - process in developing competency development (training) plans
    - parties involved in the competency development (training) plan
  - qualification structure encompassing:
    - scope of work
    - Training Packages – UEE Electrotechnology
    - units of competency
    - structure of qualification
    - off-the-job requirements
    - on-the-job requirements
  - responsibilities of parties to the contract encompassing:
    - employer responsibilities
    - learner responsibilities
    - RTO responsibilities
    - State/Territory Training Authorities (STA)
  - electrotechnology industry career opportunities encompassing:
    - industry areas
    - qualification levels
    - career paths
  - industry customs and practices encompassing:
    - industry bodies – employer and employee representatives
    - regulatory bodies – including licensing/registration, work health and safety (WHS)/occupational health and safety (OHS), industrial relations (IR), training authorities – apprentice/trainee regulation
    - VET system – Australian Qualification Framework (AQF) and credentials
  - monitoring of workplace evidence encompassing:
    - workplace exposure and practices and relationship with units of competency
    - methods of collecting workplace evidence
    - monitoring period cycle
    - requirements of workplace evidence
    - actions taken for unsatisfactory progression
    - role of STAs
    - apprentice/learner responsibilities
    - employer responsibilities
  - RTO policies encompassing:

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    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties apprentice/learner responsibilities
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belongings
    - dress regulations
    - rotating machinery, designated fire and emergency exits
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms
- RTO tour encompassing:
    - RTO layout
    - building layout
    - tour of building and RTO

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- methods of monitoring and reporting competency development activities encompassing:
  - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
  - industry requirements for monitoring workplace evidence
  - acceptable methods for monitoring and reporting workplace activities
  - apprentice's/learner's responsibility to participate in the reporting of workplace activities
  - RTO requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
  - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
  - options for appeal or assistance from RTO or STA
- enterprise work activities policies and procedures encompassing:
  - need for policies and procedures
  - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
  - following work activities procedures
- relevant training organisations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment and currently used in industry
- resources that reflect current industry practices in relation to participating in development and following a personal competency development plan

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0009 Participate in instrumentation and control work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in instrumentation, control work and competency development activities.

It includes actively participating in work activities in a competency development plan. It also includes understanding responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting reporting of competency development requirements.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with instrumentation, control	**1.1** Industry standards and workplace procedures for all

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	work and development plan		work requirements are identified and obtained
		1.2	Clarification on work and workplace procedures involved is sought from work supervisor and/or relevant person/s
		1.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures with approval of relevant person/s
2	**Monitor and respond to competency development plan**	**2.1**	Requirements of the competency development plan are confirmed in consultation with relevant person/s
		2.2	Requirements of competency development plan are followed in accordance with workplace procedures
		2.3	Skills and knowledge are applied to relevant competency requirements
		2.4	Assistance is sought from relevant person/s to develop skills and apply knowledge relevant to competency development plan requirement
		2.5	Competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
		2.6	Modifications to competency development plan are made in consultation with relevant person/s
		2.7	Report of competency development requirements are in accordance with workplace procedures
		2.8	Competency development report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC024B Participate in instrumentation and control work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0009 Participate in instrumentation and control work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- identifying and obtaining relevant industry standards and workplace procedures
- responding to a personal competency development plan
- seeking clarification on work and workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- instrumentation and control work competency development activities, including:
  - responsibilities under a competency development plan:
    - competency development (training) plans encompassing:
      - state/territory requirements (Acts/regulations)
      - competency development (training) contracts
      - competency development (training) period
      - purpose of competency development (training) plans
      - process in developing competency development (training) plans
      - parties involved in the competency development (training) plan
    - qualification structure encompassing:
      - scope of work
      - Training Packages – UEE Electrotechnology
      - units of competency
      - structure of qualification
      - off-the-job requirements
      - on-the-job requirements
    - responsibilities of parties to the contract encompassing:
      - employer responsibilities
      - learner responsibilities
      - RTO responsibilities
      - State/Territory Training Authorities (STA)
    - electrotechnology industry career opportunities encompassing:
      - industry areas
      - qualification levels
      - career paths
    - industry customs and practices encompassing:
      - industry bodies – employer and employee representatives
      - regulatory bodies – including licensing/registration, work health and safety (WHS)/occupational health and safety (OHS), industrial relations (IR), training authorities – apprentice/trainee regulation
      - VET system – Australian Qualification Framework (AQF) and credentials
    - monitoring of workplace evidence encompassing:
      - workplace exposure and practices and relationship with units of competency
      - methods of collecting workplace evidence
      - monitoring period cycle
      - requirements of workplace evidence
      - actions taken for unsatisfactory progression
      - role of STA
      - apprentice/learner responsibilities
      - employer responsibilities

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- RTO policies encompassing:
  - apprentice/learner responsibilities
  - teacher/trainer responsibilities
  - absenteeism
  - off-the-job component assessment specifications
  - on-the-job component assessment specifications
  - qualification completion requirements and award
  - advanced standing and/or recognition of prior learning (RPL)
  - result review procedures
- apprentice/learner discipline policy encompassing:
  - apprentice/learner rights
  - apprentice/learner responsibilities
  - breaches of discipline
  - types of penalties apprentice/learner responsibilities
- attendance at the RTO encompassing:
  - importance of attendance
  - record management of attendance
  - attendance cards
  - advice to employer of absences
- fire and emergencies at the RTO encompassing:
  - designated fire and emergency exits
  - procedures in the event of a fire
  - evacuation procedures
  - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
  - eye protection
  - foot protection
  - protective clothing
  - personal injuries
  - mobile phones and personal belongings
  - dress regulations
  - rotating machinery, designated fire and emergency exits
- entry requirements encompassing:
  - numeracy requirements
  - literacy requirements
  - RTO centre support mechanisms
- RTO tour encompassing:
  - RTO layout
  - building layout

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    - tour of building and RTO
- methods of monitoring and reporting competency development activities encompassing:
    - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
    - industry requirements for monitoring workplace evidence
    - acceptable methods for monitoring and reporting workplace activities
    - apprentice's/learner's responsibility to participate in the reporting of workplace activities
    - RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
    - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
    - options for appeal or assistance from RTO or STA
- enterprise work activities policies and procedures encompassing:
    - need for policies and procedures
    - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
    - following work activities procedures
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and following a personal competency development plan

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0010 Participate in refrigeration and air conditioning work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in refrigeration and air conditioning work and competency development activities.

It includes applying workplace policies and procedures and actively participating in refrigeration and air conditioning work activities in competency development. It also includes observing how refrigeration and air conditioning work is conducted, identifying responsibilities and obligations under a competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with refrigeration and air conditioning	**1.1** Workplace policies and procedures for refrigeration and air conditioning work activities are identified and

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	workplace policies and procedures	applied
	1.2	Clarification on how particular refrigeration and air conditioning work is to be carried out and the workplace procedures involved is sought from supervisor/appropriate person/s
	1.3	Unplanned situations are dealt with safely in accordance with workplace policies and procedures and with the approval of authorised person/s in a manner that minimises risk to personnel and equipment
2	**Monitor and respond to competency development plan**	**2.1** Aspects of the refrigeration and air conditioning competency development plan are confirmed in consultation with appropriate person/s
		2.2 Components of the refrigeration and air conditioning competency development plan are followed in accordance with workplace procedures
		2.3 Opportunities to practise skills and apply knowledge relevant to a particular refrigeration and air conditioning competency are pursued
		2.4 Assistance is sought from appropriate person/s to overcome difficulties in developing skills and applying knowledge relevant to refrigeration and air conditioning competency
		2.5 Progress in competency development is self-monitored against the refrigeration and air conditioning competency development plan and workplace policies and procedures
		2.6 Modifications to the competency development plan are made in consultation with appropriate person/s
		2.7 Obligations are met for periodic and timely reporting of competency development activities
		2.8 Periodic competency development activities report is validated by appropriate person/s in accordance with workplace policies and procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC025B Participate in refrigeration and air conditioning work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0010 Participate in refrigeration and air conditioning work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including risk control measures
- applying sustainable energy principles and practices
- identifying and confirming the context, requirements and responsibilities of the competency development or training plan to be met
- identifying and confirming the workplace and regulatory policies, procedures and context applicable to refrigeration and air conditioning work activities
- participating in refrigeration and air conditioning work
- periodically reviewing progress of the competency development activities in accordance with workplace requirements
- progressing against periodic or staged evaluative performance events in accordance with workplace requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- reporting periodically the competency development activities in accordance with workplace requirements
- seeking assistance to overcome difficulties in developing competency
- seeking clarification of how particular refrigeration and air conditioning work is to be carried out and the workplace procedures involved.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- competency development plan or training plan responsibilities
- methods of monitoring and reporting competency development activities
- relevant job safety assessments or risk mitigation processes

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- relevant refrigeration and air conditioning manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- refrigeration and air conditioning resources that reflect current industry practices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0011 Participate in security equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in security equipment work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant security equipment industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures with approval of relevant person/s
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant person/s
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge to a relevant competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC026B Participate in security equipment work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0011 Participate in security equipment work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- identifying, confirming and complying with relevant industry standards and workplace procedures
- monitoring and responding to a personal competency development plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- security equipment work competency development activities, including:

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- responsibilities under a competency development plan:
  - competency development (training) plans encompassing:
    - state/territories requirements (Acts/regulations)
    - competency development (training) contracts
    - competency development (training) period
    - purpose of competency development (training) plans
    - process in developing competency development (training) plans
    - parties involved in the competency development (training) plan
  - qualification structure encompassing:
    - scope of work
    - Training Packages – UEE Electrotechnology
    - units of competency
    - structure of qualification
    - off-the-job requirements
    - on-the-job requirements
  - responsibilities of parties to the contract encompassing:
    - employer responsibilities
    - learner responsibilities
    - RTO responsibilities
    - State/Territory Training Authorities (STA)
  - electrotechnology industry career opportunities encompassing:
    - industry areas
    - qualification levels
    - career paths
  - industry customs and practices encompassing:
    - industry bodies – employer and employee representatives
    - regulatory bodies – including licensing/registration, work health and safety (WHS)/occupational health and safety (OHS), industrial relations (IR), training authorities – apprentice/trainee regulation
    - VET system – Australian Qualification Framework (AQF) and credentials
  - monitoring of workplace evidence encompassing:
    - workplace exposure and practices and relationship with units of competency
    - methods of collecting workplace evidence
    - monitoring period cycle
    - requirements of workplace evidence
    - actions taken for unsatisfactory progression
    - role of STAs
    - apprentice/learner responsibilities
    - employer responsibilities
  - RTO policies encompassing:

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    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties apprentice/learner responsibilities
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belongings
    - dress regulations
    - rotating machinery, designated fire and emergency exits
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms
- RTO tour encompassing:
    - RTO layout
    - building layout
    - tour of building and RTO

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- methods of monitoring and reporting competency development activities encompassing:
  - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
  - industry requirements for monitoring workplace evidence
  - acceptable methods for monitoring and reporting workplace activities
  - apprentice's/learner's responsibility to participate in the reporting of workplace activities
  - RTO requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
  - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
  - options for appeal or assistance from RTO or STA
- enterprise work activities policies and procedures encompassing:
  - need for policies and procedures
  - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedures related to safety, effective work outcomes, customer relations, conflict resolution and competency development
  - following work activities procedures
- relevant training organisations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0012 Participate in voice and data communications work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in voice and data communications work and competency development activities.

It includes identifying responsibilities and obligations under competency development plan, following activities for developing competency, self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with relevant voice and data communications industry standards and workplace procedures	**1.1** Relevant industry standards and workplace procedures for work activities are identified and obtained

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	1.2	Clarification on work to be carried out is sought from the supervisor/relevant person/s in accordance with workplace procedures
	1.3	Unplanned situations are dealt with safely and in accordance with relevant industry standards and workplace procedures with the approval of a relevant person
2 Monitor and respond to a personal competency development plan	**2.1**	Competency development plan is confirmed in consultation with relevant person/s
	2.2	Competency development plan components are followed
	2.3	Opportunities to apply skills and knowledge to a relevant competency are identified in accordance with competency development plan
	2.4	Assistance is sought from relevant person/s and/or organisation/s to assist in developing skills and applying knowledge to a relevant competency
	2.5	Progress in competency development is self-monitored in accordance with competency development plan, relevant industry standards and workplace procedures
	2.6	Modifications to competency development plan are made in consultation with relevant person/s
	2.7	Obligations for periodic and timely reporting of competency development activities are met
	2.8	Periodic competency development activities report is validated by relevant person/s in accordance with relevant industry standards/enterprise policies and procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC016B Participate in voice and data communications work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0012 Participate in voice and data communications work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- identifying, confirming and complying with relevant industry standards and workplace procedures
- monitoring and responding to a personal competency development plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- voice and data communications work competency development activities, including:
  - responsibilities under a competency development plan:
    - competency development (training) plans encompassing:
      - state/territory requirements (Acts/regulations)
      - competency development (training) contracts
      - competency development (training) period
      - purpose of competency development (training) plans
      - process in developing competency development (training) plans
      - parties involved in the competency development (training) plan
    - qualification structure encompassing:
      - scope of work
      - Training Packages – UEE Electrotechnology
      - units of competency
      - structure of qualification
      - off-the-job requirements
      - on-the-job requirements
    - responsibilities of parties to the contract encompassing:
      - employer responsibilities
      - learner responsibilities
      - RTO responsibilities
      - State/Territory Training Authorities (STAs)
    - electrotechnology industry career opportunities encompassing:
      - industry areas
      - qualification levels
      - career paths
    - industry customs and practices encompassing:
      - industry bodies – employer and employee representatives
      - regulatory bodies – including licensing/registration, work health and safety (WHS)/occupational health and safety (OHS), industrial relations (IR), training authorities – apprentice/trainee regulation
      - vocational and technical education system – Australian Qualification Framework (AQF), credentials, Australian Qualification Training Framework (AQTF)
    - monitoring of workplace evidence encompassing:
      - workplace exposure and practices and relationship with units of competency
      - methods of collecting workplace evidence
      - monitoring period cycle
      - requirements of workplace evidence
      - actions taken for unsatisfactory progression
      - role of STA
      - apprentice/learner responsibilities

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    - employer responsibilities
- RTO policies encompassing:
    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties apprentice/learner responsibilities
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belonging
    - dress regulations
    - rotating machinery, designated fire and emergency exits
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms
- RTO tour encompassing:
    - RTO layout

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    - building layout
    - tour of building and RTO
- methods of monitoring and reporting competency development activities encompassing:
    - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
    - industry requirements for monitoring workplace evidence
    - acceptable methods for monitoring and reporting workplace activities
    - apprentice's/learner's responsibility to participate in the reporting of workplace activities
    - RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
    - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
    - options for appeal or assistance from RTO or STA
- enterprise work activities policies and procedures encompassing:
    - need for policies and procedures
    - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
    - following work activities procedures
- relevant training organisations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to participating in development and

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following a personal competency development plan
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0013 Prepare specifications for the supply of materials and equipment for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to write technical specifications for the supply of materials and equipment for electrotechnology projects.

It includes establishing performance requirements and prescribing parameters, and preparing specifications for the supply of materials and equipment. It also includes documenting and submitting quotations.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine performance and parameters of materials and equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Extent of project work is determined from design brief

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		specifications, other relevant documentation and discussions with appropriate person/s
	1.3	Performance and prescribed parameters of materials and equipment are established from design brief specifications, other relevant documentation and discussions with relevant person/s
	1.4	Required date for materials and equipment is determined from design brief specifications, other relevant documentation and discussions with relevant person/s
	1.5	Activities are planned to meet scheduled timeframes in consultation with relevant person/s
2 Prepare specifications for supply of materials and equipment	**2.1**	Manufacturer specifications and limitations of materials and equipment are sought
	2.2	Manufacturer specifications and limitations are compared with the established performance and prescribed parameters for materials and equipment
	2.3	Sources and availability of materials and equipment are established in accordance with workplace procedures
	2.4	Specifications for the supply of materials and equipment, including required evidence of compliance, are developed in accordance with workplace procedures
	2.5	Additional services are incorporated in the specifications, as required
	2.6	Solutions to unplanned events are implemented in accordance with workplace procedures
3 Document and submit quotation	**3.1**	Material and equipment supply documentation is forwarded to relevant person/s for processing in accordance with workplace procedures
	3.2	Material and equipment supply documentation is filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Preparing specifications for the supply of materials and equipment must include at least two different electrotechnology projects exceeding $20,000 and can apply to any of the following electrotechnology disciplines:

- automation technologies
- computers
- data communications
- electrical
- electrical machines
- electronics
- fire protection
- instrumentation
- refrigeration and air conditioning
- renewable/sustainable energy
- security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC004B Prepare specifications for the supply of materials and equipment for electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0013 Prepare specifications for the supply of materials and equipment for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- ascertaining the extent of project work accurately
- dealing with suppliers and manufacturers
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining performance and parameters of materials and equipment
- determining specification evidence of compliance
- documenting and submitting quotations, including specifications
- identifying need for additional services and incorporating into specifications
- preparing specifications for supply of materials and equipment
- sourcing materials and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- materials and equipment evidence of compliance for electrotechnology project
- performance-based specifications
- prescriptive specifications
- purpose and nature of specification
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications including materials and equipment performance and parameters
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including specifications

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- relevant workplace policies and procedures
- services required with the supply of equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0014 Prepare tender submissions for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare tender documents for electrotechnology projects.

It includes identifying tender requirements, verifying estimates and capacity to meet timelines. It also includes complying with legal requirements and documenting submissions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECO0001 Estimate electrotechnology projects

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Ascertain tender requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed

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	1.3	Work required under tender is determined from relevant documents
	1.4	Special conditions and requirements for lodging the tender are ascertained from relevant documents
	1.5	Appropriately competent person/s is engaged to estimate material labour and relevant costs
	1.6	Activities are planned to meet specified tender submission timeline
2 Assemble tender submission	**2.1**	All inputs to the tender are obtained and verified with relevant person/s responsible for their development
	2.2	Materials and human resources needed to complete the work under the conditions of the tender are confirmed with relevant person/s responsible
	2.3	Legal advice is sought on contingent aspects of the tender
	2.4	Contingency allowances are included in tender in accordance with workplace procedures
3 Document tender submission	**3.1**	Tender submission is documented in accordance with workplace procedures and relevant lodgement requirements
	3.2	Tender submission is verified for accuracy with relevant documents and prepared for lodgement in accordance with tender timeline

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEC006B Prepare tender submissions for electrotechnology projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0014 Prepare tender submissions for electrotechnology projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- ascertaining the tender requirements, including:
  - planning tender submission activities
  - special conditions and requirements
- assembling tender submission, including:
  - ensuring tender submission is ready for lodgement before the closing date/time
- documenting tender submission.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant documents supplied with a tender
- relevant job safety assessments or risk mitigation processes
- relevant special conditions included in a tender
- relevant tender submission requirements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to preparing tender submission for electrotechnology projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0015 Provide quotations for installation or service jobs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide quotations for electrotechnology installation and service work that includes minor installations deemed to be less complex than a major installation requiring involved delivery structures and specialised supervision up to $AU100,000.

It includes determining job specifications, using manufacturer catalogues, making enquiries, selecting compliant materials, pricing materials and labour costs, completing quotation documentation and applying workplace customer relations protocols.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine extent of installation or service work	**1.1** Scope of electrotechnology installation or service project work is determined from job specifications and discussions with customer and/or relevant person/s

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	1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for the project work area are identified and applied
	1.3	WHS/OHS and regulatory requirements are assessed and incorporated in the work specification on which the quotation is based
	1.4	Scope of installation or service work for quotation is documented as a job specification and agreement sought with customer and/or relevant person/s
	1.5	Requests for alterations to job specification are negotiated with customer and/or relevant person/s in accordance with workplace procedures and regulatory requirements
2 Develop installation or service work quotation	**2.1**	List of materials are determined accurately and checked against job specification
	2.2	Materials, labour and other relevant service and margin costs are determined in accordance with workplace costing parameters and material supplier costs
	2.3	Quotation is quantified and costed against job specification and list of materials for costing accuracy in accordance with workplace procedures
	2.4	Unplanned customer situations are responded to in accordance with workplace procedures in a manner that minimises risk to service project
	2.5	Installation or service work quotation is reviewed and approved by delegated person in accordance with workplace procedures
3 Document and submit installation or service quotation	**3.1**	Quotation is documented in accordance with workplace policies and procedures
	3.2	Quotation is submitted to customer within specified timeframes

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing at least one quotation for a minor installation job and one for a service job not exceeding $AU100,000 in value must include one of the following electrotechnology disciplines:

- automation technologies
- computers
- data communications
- electrical
- electrical machines
- electronics
- fire protection
- instrumentation
- refrigeration and air conditioning
- renewable/sustainable energy
- security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC003B Provide quotations for installation or service jobs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0015 Provide quotations for installation or service jobs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- communicating effectively with suppliers and customers
- costing small or minor jobs up to the value of $100,000, including:
  - allocating resources to be quantified and costed
  - costing labour plant and materials
  - calculating service costs and margins
- dealing with unplanned customer events/situations in accordance with workplace procedures
- determining list of material (also known as material take off), including type and quantity
- determining scope and extent of quotation work
- developing minor quotation and checking calculations using costing methods in accordance with workplace procedures
- documenting and submitting quotation in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- enterprise communication methods, including:
  - communicating with personnel involving oral communications, written procedures, and work instructions
  - communicating with customers and suppliers
- work activities records, including:
  - methods for recording and maintaining work records
  - purpose and extent of maintaining work activities records in an enterprise
  - types of records for maintaining work activities in an enterprise

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    - work records required by regulation requirements
- enterprise customer relations protocols, including:
    - dealing with customer issues
    - procedures for dealing with customers
    - purpose of customer relations
- costing methods in an enterprise, including:
    - costing policy
    - labour charge out rates
    - margins
    - purchase prices and discounts for materials
- costing small jobs, including:
    - costing labour plant and materials
    - resources to be quantified and costed
    - service costs and margins
- relevant equipment manufacturer specifications
- relevant risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace costing policies.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0016 Receive and store materials and equipment for electrotechnology work

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to receive and store materials and equipment for electrotechnology work.

It includes receiving materials and equipment, checking consignment notes, storing materials and equipment, and completing the necessary documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Receive materials and equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented

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	1.3	Documentation for material and equipment deliveries is read and content is understood
	1.4	Deliveries are inspected for damage and checked against consignment documentation before receival
	1.5	Discrepancies in deliveries are notified to work supervisor and relevant person/s in accordance with workplace procedures
	1.6	Materials and equipment are handled in accordance with WHS/OHS risk control work measures and workplace procedures
2 Store materials and equipment	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Material and equipment are stored to prevent damage or loss in accordance with workplace procedures
	2.3	Security of the stored materials and equipment is maintained in accordance with workplace procedures
	2.4	Material and equipment documentation is forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC008B Receive and store materials and equipment for electrotechnology work.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0016 Receive and store materials and equipment for electrotechnology work

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- checking deliveries and dealing with and reporting discrepancies
- determining content and time of pending deliveries from relevant documentation
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- reading and forwarding documentation
- receiving and storing materials and equipment
- storing and securing materials and equipment to prevent damage or loss.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- enterprise communication methods, including:
  - communicating with personnel, including oral communications and written procedures and work instructions
  - communicating with suppliers
  - communicating with customers
- work activities records, including:
  - purpose and extent of maintaining work activities records in an enterprise
  - types of records for maintaining work activities in an enterprise
  - methods for recording and maintaining work records
  - work records required by regulation requirements
- stock control methods, including:
  - enterprise purchasing policy
  - stock database
  - purchase and sales entry mechanisms
  - reordering methods

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- using basic computers and applications, including:
  - starting up
  - selecting application
  - entering information
  - saving
  - printing
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including consignment notes
- relevant workplace policies and procedures
- stock loss prevention
- storage, handling and security of materials and equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0017 Source and purchase material/parts for installation or service jobs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to source and purchase/order materials/parts for installation or service jobs.

It includes determining job specifications, using manufacturer catalogues, making purchasing enquiries, selecting appropriate materials/parts and completing relevant purchasing documentation.

In this unit, the value of materials for small installation jobs is limited to $AUD20,000.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine relevant materials/parts to purchase	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied in accordance with

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		workplace procedures
	1.2	WHS/OHS risk control measures and workplace procedures are followed
	1.3	Scope of installation or service work is determined from job specification drawings and/or results of service calls
	1.4	Materials/parts required for work are determined from job specifications or service calls
	1.5	Materials/parts required are documented in accordance with workplace procedures
2 Procure materials/parts	**2.1**	Source of materials/parts are determined based on availability and price in accordance with workplace procurement procedures
	2.2	Approval to purchase alternative materials/parts is sought from supervisor in accordance with workplace procurement procedures
	2.3	Prices for the supply of materials/parts, particularly non-standard high-cost items, is sought in accordance with workplace procurement procedures
	2.4	Approval to purchase materials/parts is obtained in writing from the customer or relevant person/s in accordance with workplace procurement procedures
	2.5	Purchases are initiated based on price and availability of materials/parts within the required timeframe and in accordance with workplace procurement procedures
	2.6	Appropriate information technology is used to source and purchase materials/parts
3 Document materials/parts purchases	**3.1**	Materials/parts purchased are allocated against the appropriate jobs
	3.2	Materials/parts purchases are documented in accordance with workplace procurement procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Sourcing and purchasing materials/parts must include at least one of the following electrotechnology disciplines:	• automation technologies • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology
Materials or parts purchased price documentation must include:	• discounts • goods and service tax (GST) • delivery costs
Purchase value of electrotechnology installation or service materials for small installation jobs is:	• limited to $AU20,000

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC002B Source and purchase material/parts for installation or service jobs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0017 Source and purchase material/parts for installation or service jobs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying at least two different methods to source materials
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- dealing with unplanned events in accordance with workplace procurement procedures
- determining material and part availability and arranging supply
- determining relevant materials/parts to purchase
- determining scope of work and materials/parts procurement requirements from job specifications
- documenting materials/parts purchases
- obtaining approval to purchase in accordance with workplace procurement procedures
- sourcing, obtaining quotes and purchasing appropriate materials/parts in accordance with workplace procurement procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- computers and applications, including:
  - entering information
  - printing
  - saving
  - selecting application
  - starting up
- job or project specifications
- relevant part and material manufacturer specifications
- relevant risk mitigation processes including risk control measures
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation, including:
  - methods for recording and maintaining work records
  - purpose and extent of work activities records
  - regulatory work record requirements
  - types of records for maintaining work activities
- relevant workplace policies and procedures, including procurement procedures, including:
  - common or preferred suppliers
  - delegated authority to purchase
  - procurement approvals process and procedures
  - purchasing systems
- sources or suppliers for obtaining materials/parts
- workplace communication methods, including:
  - communicating with customers
  - communicating with personnel
  - communicating with suppliers
  - oral and written communication.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0018 Contribute to the commercialisation of products/applications/services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to contribute to the commercialisation of products/applications/services.

It includes identifying and investigating opportunities for commercialisation within the organisation, commercialising a product/application/service and critically assessing the commercialisation process.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Contribute to the identification and investigation of commercialisation opportunities	**1.1** Commercialisation opportunities are identified and analysed in accordance with workplace procedures and organisational goals

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	1.2	Opportunities are evaluated to determine impact on current business and customer base
	1.3	Assessment of external factors, costs, benefits, risks, market opportunities and potential competitors is undertaken to determine the potential viability of opportunities
	1.4	Return on investment is determined in accordance with workplace procedures
	1.5	Design brief commercialisation opportunities for the product/application/service is developed in a team environment
	1.6	Approval for design brief is obtained from relevant person/s
2 Prepare to develop a product/application/service	**2.1**	Required outcomes identified in design brief with relevant person/s are confirmed
	2.2	Product/application/service is developed in consultation with relevant production personnel
	2.3	Development procedure is formulated to meet quality outcomes and manufacturer instructions for tooling, process, materials and equipment in accordance with work health and safety (WHS)/occupational health and safety (OHS) requirements and relevant industry standards
	2.4	Approval of development procedure is obtained from relevant person/s
3 Contribute to the development of design	**3.1**	Development procedure is confirmed with relevant person/s
	3.2	Development of a product/application/service product is coordinated in accordance with the design brief and workplace procedures
	3.3	Development results are recorded in accordance with workplace procedures
	3.4	Development results and characteristics outside of design and development specifications are analysed and identified

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	3.5	Changes are recommended, as required, to achieve product/application/service quality and production requirements
	3.6	Approval of changes is obtained from relevant person/s
	3.7	Product/application/service is revised, as required, to achieve quality and production requirements
4 Document and report development outcomes	**4.1**	Product/application/service development objectives are met
	4.2	Product/application/service development reporting requirements are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEER006B Contribute to the commercialisation of products/applications/ services.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0018 Contribute to the commercialisation of products/applications/services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and includes:

- employing techniques, procedures, information and resources available in the workplace
- analysing and identifying development results and characteristics outside design and development specifications
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- assessing external factors to determine the potential viability
- consulting with relevant personnel for product/application/service development
- contributing to the development of design within a team
- contributing to the identification and investigation of commercialisation opportunities
- determining return on investment
- documenting and reporting product/application/service development outcomes
- evaluating opportunities to current business and customer base
- formulating and coordinating development procedures
- identifying design brief outcomes
- preparing to develop a product/application/service
- recommending changes to achieve product/application/service quality and production requirements
- recording development results.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- products/applications/services commercialisation and safe working practices, including:
  - work in a team encompassing:
    - types of teams - managerial, administrative, project-based, commercial and social
    - roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management and clients
    - working in a team - identification and utilisation of team member skills and

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knowledge; maximising benefits of team diversity; team planning; team commitment and cooperation; improving/maximising team performance to achieve goals; team monitoring and adjustment; plain English literacy and communication; leading, facilitating, participating, coaching and mentoring

  - working with clients - client relations, client liaison and the practice of working with clients
  - conflict resolution – personality analysis tools and strategies for dealing with difficult people
- intellectual property concepts encompassing:
  - intellectual property and Australian law - the place of intellectual property in Australian law, past cases and outcomes, and necessary considerations
  - the nature of intellectual property - what is intellectual property? what isn't intellectual property? why is intellectual property relevant? what can intellectual property rights do? what can't intellectual property rights do?
  - intellectual property rights - patents, copyright, designs, confidential information and other specialty rights
  - managing intellectual property - identifying intellectual property; deciding what to protect; strategies for managing intellectual property; how intellectual property rights work together; intellectual property versus time, effort and finances; sources of assistance, including publications, intellectual property professionals, lawyers, business advisors and marketing consultants
  - enforcement of intellectual property - the enforcement process, the role of lawyers and resolution
  - the changing face of intellectual property - development of intellectual property right laws; changes to intellectual property right laws; extensions of intellectual property rights into non-traditional areas, including cultural, property arenas and the global marketplace
- commercialisation concepts encompassing:
  - commercialisation - definition of commercialisation; triggers for commercialisation; past commercialisation successes; past commercialisation failures; triggers for commercialisation; methods for identifying a good product/idea/service/application; sources of assistance in regard to commercialisation, including documents, lawyers, business advisors and marketing consultants
  - the commercialisation process - the concept; does the concept fit with the organisation's goals? is there a market? what is the market? will the product meet the market requirements? can the product be sold? how can the product be sold? can the product be produced? how can the product be produced? can the production be repeated?
  - commercialisation arrangements - sole ventures, joint ventures, licensing and legal aspects of commercialisation
  - commercialisation planning - costing, marketing, production/development, distribution and sales
  - competition - who are the competitors? what are they doing and how quickly? and internal development relevant to competition
  - critical analysis of the commercialisation process for continuous improvement -

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successes, opportunities for improvement, controllable influences, uncontrollable influences and formulation of recommendations

- WHS/OHS principles and fundamentals encompassing:
  - underlying principles of WHS/OHS
  - general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
  - employer and employee responsibilities, rights and obligations
  - major functions of safety committees and representatives
  - powers given to WHS/OHS inspectors
  - housekeeping and potential hazards in relation to improper housekeeping
  - selecting appropriate personal protective equipment (PPE) given hazardous situations
- the work environment encompassing:
  - typical hazards associated with a range of work environments
  - procedures used to control the risks associated with these hazards
  - principles of risk assessment/management and state the purpose of each
  - hierarchy of WHS/OHS hazard control measures
  - required documentation for risk assessment
  - commonly used workplace safety signs
  - workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation
  - appropriate fire extinguisher for a given type of fire
  - requirements for the location, mounting and maintenance of portable fire extinguishers
  - basic process of fighting a fire
  - safe premises, buildings and security are important in an industrial setting and the consequences of non-compliance with these
  - standard work procedure is and why they are required in some circumstances
- manual handling encompassing:
  - typical manual handling injuries and the effect they can have on lifestyle
  - situations that may cause manual handling injuries
  - correct procedures for lifting and carrying to prevent manual handling injuries
  - chemicals in the workplace encompassing:
  - hazardous substances and dangerous goods
  - classification of chemicals as hazardous substances and/or dangerous goods
  - requirements for labelling of chemicals in the workplace
  - safe storage procedures for chemicals
  - purpose of and interpretation of SDS/MSDS
- working at heights encompassing:
  - dangers associated with working on ladders and scaffolds
  - identification of work area as a height risk and use of appropriate safety equipment to prevent a fall

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    - selecting an appropriate ladder for a given situation and perform a safety check before use
    - precautions that should be taken when ascending and working off a ladder
    - precautions that should be taken when working on and around a scaffold and elevated platforms
- confined spaces encompassing:
    - hazards associated with working in a confined space
    - identifying workplace situations that could be classified as a confined space
    - control measures for working in a designated confined space
- physical and psychological hazards encompassing:
    - short and long-term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
    - effects of vibration on the human body and work practices to protect against vibration
    - effects of thermal stress on the human body and work practices to protect against thermal stress
    - effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation
    - dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger
    - occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
    - factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
    - detrimental effects and dangers of drug and alcohol use in the workplace
- working safely with electricity encompassing:
    - effects of electric shock on the human body
    - common causes of electrical accidents
    - precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and residual current devices (RCDs))
    - protection offered by RCDs
    - need for ensuring the (safe) isolation of an electrical supply
    - appropriate method of removing an electric shock victim from a live electrical situation
- life support - cardiopulmonary resuscitation (CPR) in the workplace encompassing:
    - first aid
    - responsibilities of the first aider
    - priorities of first aid management for any accident or injury
    - procedures required at an accident scene
    - legal and ethical issues, which may impact on the management of care
    - duty of care
    - examination of a casualty for injuries

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    - effect of cardiopulmonary arrest on the body
    - managing simulated conditions of airway obstruction; respiratory arrest and cardiopulmonary arrest
    - single and two-person CPR
    - signs and symptoms of an altered level of consciousness
    - management of simulation of a casualty with an altered level of consciousness
    - signs and symptoms of shock
    - management of simulation of a casualty in shock
- commercialisation
- design brief
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment used in industry
- resources that reflect current industry practices in relation to contributing to the commercialisation of products/applications/services
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0019 Contribute to the conduct of a research project

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to contribute to the conduct of a research project.

It includes identifying information sources, collecting and analysing information in accordance with research project objectives. It also includes compiling and presenting results in accordance with workplace procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Confirm research parameters	**1.1** Consultation with relevant person/s is undertaken to ensure scope, objectives and outcomes of research are identified
	1.2 Timeframes, resources, budget and quality standards for research are confirmed and applied

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		1.3	Research methodology and strategies are confirmed and agreed
2	**Identify sources and availability of information**	**2.1**	Type and range of information required is identified for research objectives
		2.2	Information sources are identified and evaluated for contribution to research
		2.3	Protocols and workplace procedures required to access information are identified and relevant action taken
		2.4	Availability of material is identified and relevant action taken
		2.5	Obstacles to the collection of information are identified and relevant action taken
3	**Collect information for research objectives**	**3.1**	Information collection methods are applied in accordance with workplace procedures and agreements with information sources
		3.2	Types and range of information collected is in accordance with research objectives
		3.3	Information is recorded in relevant format in accordance with workplace procedures
4	**Analyse and compile research information**	**4.1**	Methods of analysis and compilation are confirmed as relevant for the information collected and research objectives
		4.2	Methodologies and current technological developments are incorporated in accordance with relevant industry standards
		4.3	Results are obtained within specified time, budget and quality constraints
		4.4	Results are recorded in relevant format in accordance with workplace procedures
		4.5	Results are interpreted and conclusions documented
		4.6	Results and conclusions are reviewed with relevant person/s
5	**Present research**	**5.1**	Report/summary/presentation detailing research results and conclusions is developed in accordance with

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conclusions	workplace procedures
	5.2 Confidential information is protected in accordance with agreements and/or workplace procedures
	5.3 Sources of information are acknowledged or cited in a recognised and relevant format
	5.4 Success of the research methodology is evaluated against research objectives

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEER002B Contribute to the conduct of a research project.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0019 Contribute to the conduct of a research project

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- employing techniques, procedures, information and resources available in the workplace
- acknowledging and citing sources of information
- analysing and compiling research information
- collecting information to achieve research objectives
- confirming research parameters
- identifying scope, objectives and outcomes
- identifying sources and availability of information
- identifying type and range of information
- interpreting results and documenting conclusions
- presenting research results and conclusions
- recording information in relevant format.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- conducting research projects and safe working practices, including:
  - project planning encompassing:
    - purpose of project planning
    - documents needed to plan a project
    - factors influencing sequence and restraints of project activities
    - critical path analysis encompassing:
      - graphical representation methods
      - methods of representing time/rates
  - research concepts encompassing:
    - terminology - terminology used in a research workplace and terminology used in research-specific literature
    - theory – why conduct research, the history of research, past research successes, past

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research failures, research protocols and research practices
    - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
    - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; methodology development, including experimental design, technology selection, and information management system selection
    - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
    - research, development and commercialisation - research and development goals versus commercialisation goals and realities, research and development to inspire a commercialisation process
- work in a team encompassing:
    - types of teams - managerial, administrative, project-based, commercial and social
    - roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management and clients
    - working in a team - identification and utilisation of team member skills and knowledge; maximising benefits of team diversity; team planning; team commitment and cooperation; improving/maximising team performance to achieve goals; team monitoring and adjustment; plain English literacy and communication; and leading, facilitating, participating, coaching and mentoring
    - working with clients - client relations, client liaison, and the practice of working with clients
    - conflict resolution – personality analysis tools and strategies for dealing with difficult people
- scientific writing and communication encompassing:
    - types of scientific writing and communication - the distinguishing characteristics of the different types of scientific writing
    - purpose of the different types of scientific writing - product development justification and specifications, management advice, scientific papers/publications, conference/meeting presentations, policy documents, planning documents and reports
    - types of audience - the features and characteristics of an audience, including an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'plain English' written and oral communication
    - scientific writing techniques - the component parts of scientific documents, including aim, materials, method, results, discussion, conclusion, references; the required content of each component part; scientific referencing techniques, including bibliographies, reference lists, citations, footnotes, quotes and acknowledgements; scientific labelling techniques, including graphs, tables, diagrams and figures; techniques for documenting results, including text, graphs, tables, diagrams and figures; organisational standards for document and presentation production, including standard organisational document templates, letterheads, headers, footers and logos
    - oral communication techniques - techniques for communicating to large groups,

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including conference presentations and speeches; techniques for communicating to small groups, including meeting presentations, team discussions and planning forums
    - electronic communication formats - world-wide-web – protocols and practices; email – protocols and practices; transfer of information via CD Rom/floppy disk; use of PDF and other secure files
    - confidentiality considerations - confidentiality practices to protect the organisation, confidentiality practices to protect the client and confidentiality practices to protect providers of information/research cohorts
- data collection techniques encompassing:
    - data types - quantitative data, including empirical, non-parametric and parametric; qualitative data; raw; graphic; diagrams; original; textual; multimedia and electronic
    - data collection - data sources; consultation protocols and practices; survey methodologies, including interviews, surveys, chat rooms and focus groups; literature reviews, including traditional and web-based; group facilitation and presentation; questioning, active listening and clarification; obstacles to data collection, including unavailable data, inconsistent data, confidentiality, security and data limitations
    - evaluating data quality - reliability, accuracy, clarity and validity; contribution to research and relevance to research objectives
- data analysis and presentation encompassing:
    - data analysis techniques - univariate analysis, multivariate analysis, decision trees, genetic algorithms, neural networks, gap analysis, urgency and impact
    - data analysis technique selection - determining the correct analysis technique(s); determining the correct sequence of analysis techniques; accommodating influencing factors, including research objectives, budget, timeline and quality requirements, data limitations, confidentiality and security
    - data interpretation - determining results; determining conclusions; benchmarking; quality assurance, including consideration of accuracy, validity and clarity
    - data presentation encompassing:
        - determining the correct form of presentation for the audience, including colleagues, scientific community, marketing and commercialisation specialists, general community, industry and mixed (i.e. conference audience)
        - forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams and electronic formats; forms of verbal presentation, including meetings, client briefings and conferences; support of a new concept; need for further research; commercialisation opportunity; and quality assurance, including accuracy, validity and clarity of information presented
- product development and trials encompassing:
    - identifying client and managerial requirements for production and trials - required outcome(s), key performance indicators (KPIs), timelines, financing, resources and quality assurance
    - influencing factors - internal business goals and strategies; technical specifications (chemical, mechanical, environmental); industrial considerations; regulatory considerations; legislative considerations; intellectual property; Australian and international standards and codes of practice; market requirements; resource requirements, including personnel tools and equipment (principles and practices),

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materials and finances
    - product development arrangements - licensing agreements, joint ventures and sole ventures
    - relevant documentation - codes of practice; standard operating procedures (SOPs); product formulation documentation; safety data sheets (SDS)/material safety data sheets (MSDS); equipment and quality manuals; calibration and maintenance schedules; enterprise recording and reporting procedures; and material, equipment and product specifications
    - development and trial processes - proof of concept; trialling concepts; definitions/specifications; types of development and trial processes, including phase A product and trial, phase B product and trial, user trials, ergonomics and usability testing; pre-defined acceptance criteria, confidence limits; data collection and analysis; production; evaluation and recommendation formulation
- intellectual property concepts encompassing:
    - intellectual property and Australian law - the place of intellectual property in Australian law, past cases and outcomes, and necessary considerations
    - the nature of intellectual property - what is intellectual property? what isn't intellectual property? why is intellectual property relevant? what can intellectual property rights do? what can't intellectual property rights do?
    - intellectual property rights - patents, copyright, designs, confidential information and other specialty rights
    - managing intellectual property - identifying intellectual property; deciding what to protect; strategies for managing intellectual property; how intellectual property rights work together; intellectual property versus time, effort and finances; sources of assistance, including publications, intellectual property professionals, lawyers, business advisors and marketing consultants
    - enforcement of intellectual property - the enforcement process, the role of lawyers and resolution
    - the changing face of intellectual property - development of intellectual property right laws; changes to intellectual property right laws; extensions of intellectual property rights into non-traditional areas, including cultural, property arenas and the global marketplace
- work health and safety (WHS)/occupational health and safety (OHS) principles and fundamentals encompassing:
    - underlying principles of WHS/OHS
    - general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
    - employer and employee responsibilities, rights and obligations
    - major functions of safety committees and representatives
    - powers given to occupational health and safety inspectors
    - housekeeping and potential hazards in relation to improper housekeeping
    - selecting appropriate personal protective equipment (PPE) given hazardous situations
- the work environment encompassing:
    - typical hazards associated with a range of work environments

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- procedures used to control the risks associated with these hazards
- principles of risk assessment/management and state the purpose of each
- hierarchy of WHS/OHS hazard control measures
- required documentation for risk assessment
- commonly used workplace safety signs
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation
- appropriate fire extinguisher for a given type of fire
- requirements for the location, mounting and maintenance of portable fire extinguishers
- basic process of fighting a fire
- safe premises, buildings and security are important in an industrial setting and the consequences of non-compliance with these
- standard work procedure is and why they are required in some circumstances

- manual handling encompassing:
  - typical manual handling injuries and the effect they can have on lifestyle
  - situations that may cause manual handling injuries
  - correct procedures for lifting and carrying to prevent manual handling injuries
  - chemicals in the workplace encompassing:
  - hazardous substances and dangerous goods
  - classification of chemicals as hazardous substances and/or dangerous goods
  - requirements for labelling of chemicals in the workplace
  - safe storage procedures for chemicals
  - purpose of and interpretation of SDS/MSDS
- working at heights encompassing:
  - dangers associated with working on ladders and scaffolds
  - identification of work area as a height risk and use of appropriate safety equipment to prevent a fall
  - selecting an appropriate ladder for a given situation and performing a safety check before use
  - precautions that should be taken when ascending and working off a ladder
  - precautions that should be taken when working on and around a scaffold and elevated platforms
- confined spaces encompassing:
  - hazards associated with working in a confined space
  - identifying workplace situations that could be classified as a confined space
  - control measures for working in a designated confined space
- physical and psychological hazards encompassing:
  - short and long-term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
  - effects of vibration on the human body and work practices to protect against vibration

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    - effects of thermal stress on the human body and work practices to protect against thermal stress
    - effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation
    - dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger
    - occupational overuse syndrome, how it occurs and means to overcome it
    - factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
    - detrimental effects and dangers of drug and alcohol use in the workplace
  - working safely with electricity encompassing:
    - effects of electric shock on the human body
    - common causes of electrical accidents
    - precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and residual current devices (RCDs))
    - protection offered by RCDs
    - need for ensuring the (safe) isolation of an electrical supply
    - appropriate method of removing an electric shock victim from a live electrical situation
  - life support - cardiopulmonary resuscitation (CPR) in the workplace encompassing:
    - first aid
    - responsibilities of the first aider
    - priorities of first aid management for any accident or injury
    - procedures required at an accident scene
    - legal and ethical issues, which may impact on the management of care
    - 'duty of care'
    - examination of a casualty for injuries
    - effect of cardiopulmonary arrest on the body
    - managing simulated conditions of airway obstruction; respiratory arrest and cardiopulmonary arrest
    - single and two-person CPR
    - signs and symptoms of an altered level of consciousness
    - management of simulation of a casualty with an altered level of consciousness
    - signs and symptoms of shock
    - management of simulation of a casualty in shock
- relevant manufacturer specifications
- relevant methodologies and technological developments
- relevant timeframes, resources and budget
- relevant workplace documentation
- relevant workplace quality, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in similar workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated similar workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to contributing to the conduct of a research project
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0020 Contribute to the development of a product/application/service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to contribute to the development of a product/application/service.

It includes assisting to plan, coordinate and report on the development of a product/application/service.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Contribute to the design brief for a product/application/service	**1.1** Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are negotiated and agreed with client/s, stakeholder/s and management

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		1.2	Technical specifications, regulatory, industrial, intellectual property and market requirements of product/application/service to be developed are confirmed in accordance with workplace procedures
		1.3	Resource/s, personnel, equipment and materials required to develop product/application/service are confirmed in accordance with workplace procedures
		1.4	Quality requirements and standards for development of the product/application/service are confirmed in accordance with workplace procedures
		1.5	Design brief contributions for the product/application/service is developed within a team environment
		1.6	Approval is obtained for design brief from relevant person/s
2	**Prepare to develop a product/application/service**	**2.1**	Required outcomes identified in design brief are confirmed with relevant person/s
		2.2	Product/application/service is developed in consultation with relevant production personnel
		2.3	Development procedure is formulated to meet quality outcomes and manufacturer instructions for tooling, process, materials and equipment in accordance with work health and safety (WHS)/occupational health and safety (OHS) requirements and relevant industry standards
		2.4	Approval is obtained of development procedure from relevant person/s
3	**Contribute to the development of product/application/service**	**3.1**	Development procedure is confirmed with relevant person/s
		3.2	Product/application/service product is developed in accordance with design brief and development procedures
		3.3	Development results are recorded in accordance with workplace procedures

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	3.4	Development results and characteristics outside of design and development specifications are identified
	3.5	Changes are recommended, as required, to achieve product/application/service quality and production requirements
	3.6	Approval of change is obtained from relevant person/s
	3.7	Revision of the product/application/service to achieve quality and production requirements is coordinated, as required
4 Document and report development outcomes	**4.1**	Product/application/service development objectives are met
	4.2	Product/application/service development reporting requirements are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEER003B Contribute to the development of a product/application/ service.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0020 Contribute to the development of a product/application/service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- employing techniques, procedures, information and resources available in the workplace
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- completing development reporting in accordance with workplace procedures
- confirming quality requirements and standards
- confirming resources, personnel, equipment and materials required to develop product/application/service
- contributing to development of design brief for a product/application/service
- contributing to the development of a product/application/service
- documenting and reporting product/application/service development outcomes
- formulating development procedures in accordance with WHS/OHS and relevant industry standards
- identifying development results and characteristics outside of design and specifications
- preparing to develop a product/application/service
- recommending changes to product/application/service quality and production requirements
- recording development results.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- product/application/service development and safe working practices, including:
  - project planning encompassing:
    - purpose of project planning
    - documents needed to plan a project
    - factors influencing sequence and restraints of project activities
    - critical path analysis encompassing:
      - graphical representation methods

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    - methods of representing time/rates
- project management encompassing:
    - defining project parameters - project scope, project stakeholders and clients, project phases and the relationship between phases, time requirements and limitations, resource requirements and limitations, quality requirements and limitations
    - time management - time management concepts and standard practices for ensuring a project runs to time
    - financial management - financial management concepts; standard practices for managing project finances, project budgets, costs, variations and estimations; invoicing against project phases/deliverables and acquittals
    - quality management - quality management concepts and standard practices for managing quality within a project
    - human resource management - human resource management concepts and standard practices for managing personnel within a project
    - communication management - communication management concepts and standard practices for managing communication within a project
    - risk management and contingencies - risk management concepts, standard practices for managing risk within a project, internal risks, external risks, risk minimisation, risk removal and contingencies
    - procurement management - procurement management concepts and standard practices for managing procurement
    - physical resource management - types of physical resource, including equipment, technology, information and facilities; physical resource management concepts; and standard practices for managing physical resources
    - contracts - understanding project contracts; standard practices for working to contract specifications; contract format; contract content; legal obligations of contract parties; and accompanying documentation, including contract schedules
    - performance assessment and continuous improvement - standard performance assessment practices and standard continuous improvement practices
    - engineering ethics principles
- work in a team encompassing:
    - types of teams - managerial, administrative, project-based, commercial and social
    - roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management and clients
    - working in a team - identification and utilisation of team member skills and knowledge; maximising benefits of team diversity; team planning; team commitment and cooperation; improving/maximising team performance to achieve goals; team monitoring and adjustment; plain English literacy and communication; and leading, facilitating, participating, coaching and mentoring
    - working with clients - client relations, client liaison and the practice of working with clients
    - conflict resolution – personality analysis tools and strategies for dealing with difficult people
- scientific writing and communication encompassing:

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- types of scientific writing and communication - the distinguishing characteristics of the different types of scientific writing
- purpose of the different types of scientific writing - product development justification and specifications, management advice, scientific papers/publications, conference/meeting presentations, policy documents, planning documents and reports
- types of audience - the features and characteristics of an audience, including an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'plain English' written and oral communication
- scientific writing techniques - the component parts of scientific documents, including aim, materials, method, results, discussion, conclusion, references; the required content of each component part; scientific referencing techniques, including bibliographies, reference lists, citations, footnotes, quotes and acknowledgements; scientific labelling techniques, including graphs, tables, diagrams and figures; techniques for documenting results, including text, graphs, tables, diagrams, and figures; organisational standards for document and presentation production, including standard organisational document templates, letterheads, headers, footers and logos
- oral communication techniques - techniques for communicating to large groups, including conference presentations and speeches; techniques for communicating to small groups, including meeting presentations, team discussions and planning forums
- electronic communication formats - world-wide-web – protocols and practices; email – protocols and practices; transfer of information via CD Rom/floppy disk; use of PDF and other secure files
- confidentiality considerations - confidentiality practices to protect the organisation, confidentiality practices to protect the client and confidentiality practices to protect providers of information/research cohorts

- data collection techniques encompassing:
  - data types - quantitative data, including empirical, non-parametric, parametric; qualitative data; raw; graphic; diagrams; original; textual; multimedia and electronic
  - data collection - data sources; consultation protocols and practices; survey methodologies, including interviews, surveys, chat rooms and focus groups; literature reviews, including traditional and web-based; group facilitation and presentation; questioning, active listening and clarification; obstacles to data collection, including unavailable data, inconsistent data, confidentiality, security and data limitations
  - evaluating data quality - reliability, accuracy, clarity and validity; contribution to research; and relevance to research objectives
- data analysis and presentation encompassing:
  - data analysis techniques - univariate analysis, multivariate analysis, decision trees, genetic algorithms, neural networks, gap analysis, urgency and impact
  - data analysis technique selection - determining the correct analysis technique(s); determining the correct sequence of analysis techniques; accommodating influencing factors, including research objectives, budget, timeline and quality requirements, data limitations, confidentiality and security
  - data interpretation - determining results; determining conclusions; benchmarking; quality assurance, including consideration of accuracy, validity and clarity
  - data presentation:

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    - determining the correct form of presentation for the audience, including colleagues, scientific community, marketing and commercialisation specialists, general community, industry and mixed (i.e. conference audience)
    - forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams and electronic formats; forms of verbal presentation, including meetings, client briefings and conferences; support of a new concept; need for further research; commercialisation opportunity; and quality assurance, including accuracy, validity and clarity of information presented
- product development and trials encompassing:
  - identifying client and managerial requirements for production and trials - required outcome(s), key performance indicators (KPIs), timelines, financing, resources and quality assurance
  - influencing factors - internal business goals and strategies; technical specifications (chemical, mechanical, environmental); industrial considerations; regulatory considerations; legislative considerations; intellectual property; Australian and international standards and codes of practice; market requirements; resource requirements, including personnel tools and equipment (principles and practices), materials and finances
  - product development arrangements - licensing agreements, joint ventures and sole ventures
  - relevant documentation - codes of practice, standard operating procedures (SOPs), product formulation documentation, safety data sheets (SDS)/material safety data sheets (MSDS), equipment and quality manuals, calibration and maintenance schedules, enterprise recording and reporting procedures, material, equipment and product specifications
  - development and trial processes - proof of concept; trailing concepts; definitions/specifications; types of development and trial processes, including phase A product and trial, phase B product and trial, user trials, ergonomics and usability testing; pre-defined acceptance criteria, confidence limits; data collection and analysis; production; evaluation and recommendation formulation
- intellectual property concepts encompassing:
  - intellectual property and Australian law - the place of intellectual property in Australian law, past cases and outcomes, and necessary considerations
  - the nature of intellectual property - what is intellectual property? what isn’t intellectual property? why is intellectual property relevant? what can intellectual property rights do? what can’t intellectual property rights do?
  - intellectual property rights - patents, copyright, designs, confidential information and other specialty rights
  - managing intellectual property - identifying intellectual property; deciding what to protect; strategies for managing intellectual property; how intellectual property rights work together; intellectual property versus time, effort, finances; sources of assistance, including publications, intellectual property professionals, lawyers, business advisors and marketing consultants
  - enforcement of intellectual property - the enforcement process, the role of lawyers and resolution

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    - the changing face of intellectual property - development of intellectual property right laws; changes to intellectual property right laws; extensions of intellectual property rights into non-traditional areas, including cultural, property arenas and the global marketplace
- work health and safety (WHS)/occupational health and safety (OHS) principles and fundamentals encompassing:
    - underlying principles of WHS/OHS
    - general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
    - employer and employee responsibilities, rights and obligations
    - major functions of safety committees and representatives
    - powers given to occupational health and safety inspectors
    - housekeeping and potential hazards in relation to improper housekeeping
    - selecting appropriate personal protective equipment (PPE) given hazardous situations
- the work environment encompassing:
    - typical hazards associated with a range of work environments
    - procedures used to control the risks associated with these hazards
    - principles of risk assessment / management and state the purpose of each
    - hierarchy of WHS/OHS hazard control measures
    - required documentation for risk assessment
    - commonly used workplace safety signs
    - workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation
    - appropriate fire extinguisher for a given type of fire
    - requirements for the location, mounting and maintenance of portable fire extinguishers
    - basic process of fighting a fire
    - safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these
    - standard work procedure is and why they are required in some circumstances
- manual handling encompassing:
    - typical manual handling injuries and the effect they can have on lifestyle
    - situations that may cause manual handling injuries
    - correct procedures for lifting and carrying to prevent manual handling injuries
    - chemicals in the workplace encompassing:
    - hazardous substances and dangerous goods
    - classification of chemicals as hazardous substances and/or dangerous goods
    - requirements for labelling of chemicals in the workplace
    - safe storage procedures for chemicals
    - purpose of and interpretation of SDS/MSDS
- working at heights encompassing:

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  - dangers associated with working on ladders and scaffolds
  - identification of work area as a height risk and use appropriate safety equipment to prevent a fall
  - selecting an appropriate ladder for a given situation and perform a safety check before use
  - precautions that should be taken when ascending and working off a ladder
  - precautions that should be taken when working on and around a scaffold and elevated platforms
- confined spaces encompassing:
  - hazards associated with working in a confined space
  - identifying workplace situations that could be classified as a confined space
  - control measures for working in a designated confined space
- physical and psychological hazards encompassing:
  - short and long-term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
  - effects of vibration on the human body and work practices to protect against vibration
  - effects of thermal stress on the human body and work practices to protect against thermal stress
  - effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation
  - dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger
  - occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
  - factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
  - detrimental effects and dangers of drug and alcohol use in the workplace
- working safely with electricity encompassing:
  - effects of electric shock on the human body
  - common causes of electrical accidents
  - precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and residual current devices (RCDs))
  - protection offered by RCDs
  - need for ensuring the (safe) isolation of an electrical supply
  - appropriate method of removing an electric shock victim from a live electrical situation
- life support - cardiopulmonary resuscitation (CPR) in the workplace encompassing:
  - first aid
  - responsibilities of the first aider
  - priorities of first aid management for any accident or injury
  - procedures required at an accident scene

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    - legal and ethical issues, which may impact on the management of care
    - duty of care
    - examination of a casualty for injuries
    - effect of cardiopulmonary arrest on the body
    - managing simulated conditions of airway obstruction; respiratory arrest and cardiopulmonary arrest
    - single and two-person CPR
    - signs and symptoms of an altered level of consciousness
    - management of simulation of a casualty with an altered level of consciousness
    - signs and symptoms of shock
    - management of simulation of a casualty in shock
- design brief
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace, quality, policies and procedures
- team environments.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to contributing to the development of a product/application/service
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0021 Contribute to the planning of a research project

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to contribute to the planning of a research project.

It includes the ability to gather background information relevant to a research project, interpret and analyse the context of the research project, and contribute to the development of a research plan.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Acquire and interpret information relevant to research project	**1.1** Information sources of research topic are identified and evaluated for reliability and validity
	1.2 Information about the consumer product market and competition is collected, reviewed and interpreted

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	1.3	Key client/stakeholder views and interests are identified and recorded
	1.4	Industrial, legal, ethical and political context of the research project are identified and applied
2 Analyse the logistics of a research project	**2.1**	Client, stakeholder and organisational requirements are identified and explained
	2.2	Contractual obligations of project are identified and implemented
	2.3	Resources to support the project are identified and acquired
	2.4	Quality standards for the project are identified and maintained
3 Contribute to the planning of a research project	**3.1**	Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected in accordance with workplace procedures
	3.2	Project phases, milestones, reporting and review points are identified in accordance with workplace procedures
	3.3	Criteria for evaluating each project deliverable against pre-defined quality standards are developed in accordance with workplace procedures
	3.4	A research plan is developed in accordance with workplace procedures
4 Seek endorsement and distribution of research project plan	**4.1**	Draft research plan is forwarded to client/s, stakeholder/s and/or relevant person/s for consideration and appraisal
	4.2	Draft research plan is amended to incorporate recommended improvements from client/s, stakeholder/s and/or relevant person/s
	4.3	Final research plan is confirmed in accordance with project deliverables by relevant person/s
	4.4	Final research plan is distributed to relevant person/s and team members

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEER001B Contribute to the planning of a research project.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0021 Contribute to the planning of a research project

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- employing techniques, procedures, information and resources available in the workplace
- acquiring and interpreting information relevant to research project
- analysing logistics of a research project
- applying industrial, legal, ethical and political context
- contributing to the planning of a research project
- developing criteria for evaluating each project deliverable
- distributing final research plan
- identifying and evaluating information sources
- identifying and maintaining quality standards
- identifying contractual obligations of project
- incorporating improvements from clients/stakeholders/relevant personnel
- reviewing and interpreting consumer product market information
- seeking endorsement and distribution of a research project plan
- selecting project objectives, methodology and strategies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- research project planning and safe working practices, including:
  - project planning encompassing:
    - purpose of project planning
    - documents needed to plan a project
    - factors influencing sequence and restraints of project activities
  - critical path analysis encompassing:
    - graphical representation methods
    - methods of representing time/rates
  - project management encompassing:

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- defining project parameters - project scope; project stakeholders and clients; project phases and the relationship between phases; time requirements and limitations; resource requirements and limitations; quality requirements and limitations
- time management - time management concepts and standard practices for ensuring a project runs to time
- financial management - financial management concepts; standard practices for managing project finances, project budgets, costs, variations and estimations; invoicing against project phases/deliverables and acquittals
- quality management - quality management concepts and standard practices for managing quality within a project
- human resource management - human resource management concepts and standard practices for managing personnel within a project
- communication management - communication management concepts and standard practices for managing communication within a project
- risk management and contingencies - risk management concepts; standard practices for managing risk within a project; internal risks; external risks; risk minimisation; risk removal and contingencies
- procurement management - procurement management concepts and standard practices for managing procurement
- physical resource management - types of physical resource, including equipment, technology, information and facilities; physical resource management concepts; and standard practices for managing physical resources
- contracts - understanding project contracts; standard practices for working to contract specifications; contract format; contract content; legal obligations of contract parties; and accompanying documentation, including contract schedules
- performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices
- engineering ethics principles

- research concepts encompassing:
  - terminology - terminology used in a research workplace and terminology used in research-specific literature
  - theory – why conduct research, the history of research, past research successes, past research failures, research protocols and research practices
  - the research environment - the research work environment; standard research practices; industrial, legal, ethical, political and market environment considerations; legislation and regulation; and contractual obligations of all parties
  - planning to conduct research - concept development and/or research brief analysis; research objectives; research deliverables; research project plan; literature reviews; and methodology development, including experimental design, technology selection, and information management system selection
  - clients - identifying client viewpoints and stake in project; identifying client requirements and parameters; determining research budgets, timelines, milestones and quality attributes with clients
  - research, development and commercialisation - research and development goals

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versus commercialisation goals and realities; research and development to inspire a commercialisation process

- work in a team encompassing:
  - types of teams - managerial, administrative, project-based, commercial and social
  - roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management and clients
  - working in a team - identification and utilisation of team member skills and knowledge; maximising benefits of team diversity; team planning; team commitment and cooperation; improving/maximising team performance to achieve goals; team monitoring and adjustment; plain English literacy and communication; and leading, facilitating, participating, coaching and mentoring
  - working with clients - client relations, client liaison and the practice of working with clients
  - conflict resolution – personality analysis tools and strategies for dealing with difficult people
- scientific writing and communication encompassing:
  - types of scientific writing and communication - the distinguishing characteristics of the different types of scientific writing
  - purpose of the different types of scientific writing - product development justification and specifications; management advice; scientific papers/publications; conference/meeting presentations; policy documents; planning documents and reports
  - types of audience - the features and characteristics of an audience, including an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'plain English' written and oral communication
  - scientific writing techniques - the component parts of scientific documents, including aim, materials, method, results, discussion, conclusion, references and the required content of each component part; scientific referencing techniques, including bibliographies, reference lists, citations, footnotes, quotes, and acknowledgements; scientific labelling techniques, including graphs, tables, diagrams and figures; techniques for documenting results, including text, graphs, tables, diagrams and figures; organisational standards for document and presentation production, including standard organisational document templates, letterheads, headers, footers and logos
  - oral communication techniques - techniques for communicating to large groups, including conference presentations and speeches; techniques for communicating to small groups, including meeting presentations, team discussions and planning forums
  - electronic communication formats - world-wide-web – protocols and practices; email – protocols and practices; transfer of information via CD Rom/floppy disk; use of PDF and other secure files
  - confidentiality considerations - confidentiality practices to protect the organisation, confidentiality practices to protect the client, and confidentiality practices to protect providers of information/research cohorts
- data collection techniques encompassing:
  - data types - quantitative data, including empirical, non-parametric, parametric; qualitative data; raw; graphic; diagrams; original; textual; multimedia and electronic

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    - data collection - data sources; consultation protocols and practices; survey methodologies, including interviews, surveys, chat rooms and focus groups; literature reviews, including traditional and web-based; group facilitation and presentation; questioning; active listening and clarification; obstacles to data collection, including unavailable data, inconsistent data, confidentiality, security and data limitations
    - evaluating data quality - reliability, accuracy, clarity, validity, contribution to research and relevance to research objectives
- data analysis and presentation encompassing:
    - data analysis techniques - univariate analysis, multivariate analysis, decision trees, genetic algorithms, neural networks, gap analysis, urgency and impact
    - data analysis technique selection - determining the correct analysis techniques; determining the correct sequence of analysis techniques; accommodating influencing factors, including research objectives, budget, timeline and quality requirements, data limitations, confidentiality and security
    - data interpretation - determining results; determining conclusions; benchmarking; quality assurance, including consideration of accuracy, validity and clarity
- data presentation:
    - determining the correct form of presentation for the audience, including colleagues, scientific community, marketing and commercialisation specialists, general community, industry and mixed (i.e. conference audience)
    - forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; forms of verbal presentation, including meetings, client briefings and conferences; support of a new concept; need for further research; commercialisation opportunity; and quality assurance, including accuracy, validity and clarity of information presented
- product development and trials encompassing:
    - identifying client and managerial requirements for production and trials - required outcome(s), key performance indicators (KPIs), timelines, financing, resources and quality assurance
    - influencing factors - internal business goals and strategies; technical specifications (chemical, mechanical and environmental); industrial considerations; regulatory considerations; legislative considerations; intellectual property; Australian and international standards and codes of practice; market requirements; resource requirements, including personnel tools and equipment (principles and practices), materials and finances
    - product development arrangements - licensing agreements, joint ventures and sole ventures
    - relevant documentation - codes of practice; standard operating procedures (SOPs); product formulation documentation; safety data sheets (SDS)/material safety data sheets (MSDS); equipment and quality manuals; calibration and maintenance schedules; enterprise recording and reporting procedures; material, equipment and product specifications
    - development and trial processes - proof of concept; trialling concepts; definitions/specifications; types of development and trial processes, including phase A product and trial, phase B product and trial, user trials, ergonomics and usability

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testing; pre-defined acceptance criteria, confidence limits; data collection and analysis; production; evaluation and recommendation formulation

- intellectual property concepts encompassing:
  - intellectual property and Australian law - the place of intellectual property in Australian law, past cases and outcomes, and necessary considerations
  - the nature of intellectual property - what is intellectual property? what isn't intellectual property? why is intellectual property relevant? what can intellectual property rights do and what can't intellectual property rights do?
  - intellectual property rights - patents, copyright, designs, confidential information and other specialty rights
  - managing intellectual property - identifying intellectual property; deciding what to protect; strategies for managing intellectual property; how can intellectual property rights work together; intellectual property versus time, effort, finances; sources of assistance, including publications, intellectual property professionals, lawyers, business advisors and marketing consultants
  - enforcement of intellectual property - the enforcement process, the role of lawyers and resolution
  - the changing face of intellectual property - development of intellectual property right laws; changes to intellectual property right laws; extensions of intellectual property rights into non-traditional areas, including cultural, property arenas and the global marketplace
- commercialisation concepts encompassing:
  - commercialisation - definition of commercialisation; triggers for commercialisation; past commercialisation successes; past commercialisation failures; triggers for commercialisation; methods for identifying a good product/idea/service/application; sources of assistance in regard to commercialisation, including documents, lawyers, business advisors and marketing consultants
  - the commercialisation process - the concept; does the concept fit with the organisation's goals? is there a market? what is the market? will the product meet the market requirements? can the product be sold? how can the product be sold? can the product be produced? how can the product be produced? can the production be repeated?
  - commercialisation arrangements - sole venture, joint venture, licensing and legal aspects of commercialisation
  - commercialisation planning - costing, marketing, production/development, distribution and sales
  - competition - who are the competitors? what are they doing and how quickly? And internal development relevant to competition
  - critical analysis of the commercialisation process for continuous improvement - successes, opportunities for improvement, controllable influences, uncontrollable influences and formulation of recommendations
- work health and safety (WHS)/occupational health and safety (OHS) principles and fundamentals encompassing:
  - underlying principles of WHS/OHS

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- general aims and objectives of the relevant state or territory legislation relating to WHS/OHS
- employer and employee responsibilities, rights and obligations
- major functions of safety committees and representatives
- powers given to WHS/OHS inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

- the work environment encompassing:
  - typical hazards associated with a range of work environments
  - procedures used to control the risks associated with these hazards
  - principles of risk assessment / management and state the purpose of each
  - hierarchy of WHS/OHS hazard control measures
  - required documentation for risk assessment
  - commonly used workplace safety signs
  - workplace emergencies that pose a threat to health and safety and suitable procedures for an emergency workplace evacuation
  - appropriate fire extinguisher for a given type of fire
  - requirements for the location, mounting and maintenance of portable fire extinguishers
  - basic process of fighting a fire
  - importance of safe premises, buildings and security in an industrial setting and the consequences of non-compliance with these
  - standard work procedures and why they are required in some circumstances
- manual handling encompassing:
  - typical manual handling injuries and the effect they can have on lifestyle
  - situations that may cause manual handling injuries
  - correct procedures for lifting and carrying to prevent manual handling injuries
  - chemicals in the workplace encompassing:
  - hazardous substances and dangerous goods
  - classification of chemicals as hazardous substances and/or dangerous goods
  - requirements for labelling of chemicals in the workplace
  - safe storage procedures for chemicals
  - purpose of and interpretation of SDS/MSDS
- working at heights encompassing:
  - dangers associated with working on ladders and scaffolds
  - identification of work area as a height risk and use appropriate safety equipment to prevent a fall
  - selecting an appropriate ladder for a given situation and performing a safety check before use
  - precautions that should be taken when ascending and working off a ladder
  - precautions that should be taken when working on and around a scaffold and elevated

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platforms

- confined spaces encompassing:
  - hazards associated with working in a confined space
  - identifying workplace situations that could be classified as a confined space
  - control measures for working in a designated confined space
- physical and psychological hazards encompassing:
  - short and long-term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
  - effects of vibration on the human body and work practices to protect against vibration
  - effects of thermal stress on the human body and work practices to protect against thermal stress
  - effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation
  - dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger
  - occupational overuse syndrome, how it occurs and means to overcome it
  - factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
  - detrimental effects and dangers of drug and alcohol use in the workplace
- working safely with electricity encompassing:
  - effects of electric shock on the human body
  - common causes of electrical accidents
  - precautions that can minimise the chance of electric shock (earthing, extra-low voltage (ELV), fuses, circuit breakers and residual current devices (RCDs))
  - protection offered by RCDs
  - need for ensuring the (safe) isolation of an electrical supply
  - appropriate method of removing an electric shock victim from a live electrical situation
- life support - cardiopulmonary resuscitation (CPR) in the workplace encompassing:
  - first aid
  - responsibilities of the first aider
  - priorities of first aid management for any accident or injury
  - procedures required at an accident scene
  - legal and ethical issues, which may impact on the management of care
  - 'duty of care'
  - examination of a casualty for injuries
  - effect of cardiopulmonary arrest on the body
  - managing simulated conditions of airway obstruction; respiratory arrest and cardiopulmonary arrest
  - single and two-person CPR
  - signs and symptoms of an altered level of consciousness

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    - management of simulation of a casualty with an altered level of consciousness
    - signs and symptoms of shock
    - management of simulation of a casualty in shock
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to contributing to the planning of a research project
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0022 Participate in electrical machine repair work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in electrical machine repair work and competency development activities.

It includes participating in and complying with electrical machine repair workplace policies and procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with electrical machine repair workplace policies and procedures	**1.1** Workplace policies and procedures for work activities are identified and applied
	1.2 Work activities and relevant workplace procedures are

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			sought and clarified with supervisor/relevant person/s
		1.3	Unplanned situations are dealt with safely and in accordance with workplace policies and procedures and with approval of relevant person/s
2	**Participate in electrical machine repair work**	**2.1**	Skills and knowledge required for work activities are confirmed in consultation with relevant person/s
		2.2	Opportunities to practise skills and apply relevant knowledge to work activities are pursued
		2.3	Assistance is sought from appropriate person/s to overcome difficulties in developing skills and applying knowledge to relevant to work activities
		2.4	Feedback on progress in electrical machine repair competency development is self-monitored against required skills, knowledge and workplace procedures
		2.5	Additional skill development is sought in consultation with relevant person/s
		2.6	Electrical machine repair work activities are completed and validated by relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC018B Participate in electrical machine repair work and competency development activities.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0022 Participate in electrical machine repair work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- completing machine repair work activities
- complying with electrical machine repair workplace policies and procedures
- identifying and confirming industry standards, regulatory and workplace procedures
- identifying skill development opportunities
- participating in electrical machine repair work.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical machine repair work competency development activities, including:
  - responsibilities under a competency development plan:
    - competency development (training) plans encompassing:
      - state/territory requirements (Acts/regulations)
      - competency development (training) contracts
      - competency development (training) period
      - purpose of competency development (training) plans
      - process in developing competency development (training) plans
      - parties involved in the competency development (training) plan
    - qualification structure encompassing:
      - scope of work
      - Training Packages – UEE Electrotechnology
      - units of competency
      - structure of qualification
      - off-the-job requirements
      - on-the-job requirements
    - responsibilities of parties to the contract encompassing:
      - employer responsibilities
      - learner responsibilities
      - RTO responsibilities
      - State/Territory Training Authorities (STAs)
    - electrotechnology industry career opportunities encompassing:
      - industry areas
      - qualification levels
      - career paths
    - industry customs and practices encompassing:
      - industry bodies – employer and employee representatives
      - regulatory bodies – including licensing/registration, WHS/OHS, industrial relations (IR), training authorities – apprentice/trainee regulation
      - VET system – Australian Qualification Framework (AQF) and credentials
    - monitoring of workplace evidence encompassing:
      - workplace exposure and practices and relationship with units of competency
      - methods of collecting workplace evidence
      - monitoring period cycle
      - requirements of workplace evidence
      - actions taken for unsatisfactory progression

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    - role of STA
    - apprentice/learner responsibilities
    - employer responsibilities
- RTO policies encompassing:
    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points importance of attendance
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belongings
    - dress regulations
    - rotating machinery, designated fire and emergency exits
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms

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- RTO tour encompassing:
  - RTO layout
  - building layout
  - tour of building and RTO
- methods of monitoring and reporting competency development activities encompassing:
  - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
  - industry requirements for monitoring workplace evidence
  - acceptable methods for monitoring and reporting workplace activities
  - apprentice's/learner's responsibility to participate in the reporting of workplace activities
  - RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
  - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
  - options for appeal or assistance from RTO or STA
- enterprise work activities policies and procedures encompassing:
  - need for policies and procedures
  - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
  - following work activities procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0023 Participate in electrical work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in electrical work and related activities that contribute to the ongoing development of competency.

It includes complying with electrical industry and organisational policies and procedures, undertaking work and related activities in accordance with a competency development plan, documenting and periodically reporting work activities, and participating in periodic reviews to monitor one's own competency development.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the requirements of this unit.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Engage in a competency development plan	**1.1** Context and conditions under which the competency development plan is to be undertaken are identified and confirmed
	1.2 Roles and obligations of all parties/stakeholders with respect to the competency development plan are identified and confirmed
	1.3 Competency development plan is agreed upon, finalised and executed by all relevant parties/stakeholders
2 Participate in electrical competency development work activities	**2.1** Industry/organisational policies and procedures for work and competency development activities are identified, obtained and reviewed
	2.2 Electrical work is undertaken in accordance with the competency development plan and applicable industry/organisational policies and procedures
	2.3 Opportunities to practise skills and apply knowledge relevant to the development of competency are utilised
3 Monitor and report on competency development	**3.1** Records of competency development work activities are maintained and updated on a regular basis
	3.2 Obligations are met for periodic and timely reporting of competency development activities
	3.3 Periodic competency development report is verified and validated by appropriate person/s within accepted industry timelines
	3.4 Progress in the competency development plan is self-monitored and assistance is sought from appropriate person/s to overcome difficulties or deficiencies
	3.5 Modifications to the competency development plan are made in consultation with appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

This unit must be demonstrated under the relevant State/Territory Training Act and must include one of the following:	• an apprenticeship • other approved training contract or arrangement permitted under state/territory legislation
Electrical competency development work activities must include the following:	• installing and terminating cables and conductors • installing wiring systems and supports • installing electrical equipment • servicing or maintaining electrical equipment • testing and inspecting electrical circuits and equipment • fault finding and repairing electrical circuits and equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC020B Participate in electrical work and competency development activities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0023 Participate in electrical work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include:

- participating in the development of a competency development plan for a specified electrotechnology work function, including:
  - identifying competencies to be undertaken
  - identifying responsibilities of all relevant parties/stakeholders
- undertaking electrical work relevant to the scope of competencies specified in the competency development plan, including:
  - experience in relevant work areas
  - exposure to a relevant range of equipment
- periodically documenting and reporting electrical work activities to the relevant parties/stakeholders, including:
  - the workplace activities that have been undertaken
  - the range of equipment used for the work
  - the level of supervision under which the work was undertaken
  - submitting work activities records for verification by authorised personnel
- participating in regular periodic reviews to evaluate progress in competency development, including:
  - consultation with relevant parties/stakeholders overseeing the administration of the competency development plan
  - review of participation in undertaking, documenting and reporting electrical work activities
  - review of progress against agreed benchmarks
  - develop and implement strategies in consultation with appropriate personnel to address any difficulties or deficiencies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- competency development plans, including:
  - formal training agreements, including:
    - state/territory regulations
    - employer, learner and training organisation roles and responsibilities
  - training plans or individual learning plans, including:
    - parties involved
    - scope of competencies specified
    - nominal training periods
- roles of electrotechnology industry bodies applicable to the context and conditions under which the competency development plan will be undertaken, including:
  - unions
  - employer associations
  - work health and safety (WHS)/occupational health and safety (OHS) regulatory bodies
  - electrical regulatory bodies
- training organisation policies and procedures applicable to the context and conditions under which the competency development plan will be undertaken
- electrotechnology workplace policies and procedures applicable to the context and conditions under which the competency development plan will be undertaken, including:
  - health and safety
  - anti-discrimination
  - effective work outcomes
  - customer relations
  - conflict resolution
  - supervision and competency development
- documenting and reporting evidence of work activities, including:
  - methods of documenting evidence of workplace activities
  - aspects of work activities evidence, including:
    - work task/area
    - degree of participation
    - range of equipment
    - levels of supervision
  - learner responsibilities in relation to periodic reporting of work activities and consequences of failing to meet obligations
  - employer responsibilities in relation to verifying work activities evidence
  - training organisation responsibilities in relation to monitoring work activities evidence
  - procedures for periodic review of work activities evidence
  - procedures for addressing difficulties or deficiencies in various aspects of work activities evidence.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0024 Participate in switchgear and control gear work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to participate in switchgear and control gear work and competency development activities.

It includes participating in and complying with switchgear and control gear workplace policies and procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Comply with switchgear and control gear workplace policies and procedures	**1.1** Workplace policies and procedures for work activities are identified and applied
	1.2 Work activities and relevant workplace procedures are

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			obtained and clarified with supervisor/relevant person/s
		1.3	Unplanned situations are dealt with safely and in accordance with workplace policies and procedures and approval of authorised person/s
2	**Participate in switchgear and control gear work**	**2.1**	Skills and knowledge required for work activities are confirmed in consultation with appropriate person/s
		2.2	Opportunities to practise skills and apply relevant knowledge to work activities are pursued
		2.3	Assistance is sought from relevant person/s to overcome difficulties in developing skills and applying knowledge relevant to work activities
		2.4	Feedback on progress in switchgear and control gear competency development is self-monitored against required skills, knowledge and workplace policies and procedures
		2.5	Additional skill development is sought in consultation with relevant person/s
		2.6	Switchgear and control gear work activities are completed and validated by relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC019B Participate in switchgear and controlgear work and competency development activities.

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Links

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Assessment Requirements for UEECO0024 Participate in switchgear and control gear work and competency development activities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- identifying and confirming the context, requirements and responsibilities of the competency development (training) plan to be met
- identifying and confirming the critical industry, enterprise and regulatory policies, procedures and context applicable to all work activities
- identifying and confirming the applicable training practices, requirements, administration, costs and support service policies and procedures provided by the Registered Training Organisation (RTO) to all vocational education and training (VET) activities
- seeking clarification of how particular work is to be carried out and the procedures involved
- dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
- reporting periodically the competency development activities in accordance with requirements
- periodically reviewing progress of the competency development activities in accordance with requirements
- pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- progressing successfully against periodic or staged evaluative performance events according to requirements
- seeking assistance to overcome difficulties in developing competency
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- participating and completing switchgear and control gear work activities
- complying with switchgear and control gear workplace policies and procedures
- identifying skill development opportunities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements and performance criteria and include knowledge of:

- switchgear and control gear work competency development activities, including:
  - responsibilities under a competency development plan:
    - competency development (training) plans encompassing:
      - state/territory requirements (Acts/regulations)
      - competency development (training) contracts
      - competency development (training) period
      - purpose of competency development (training) plans
      - process in developing competency development (training) plans
      - parties involved in the competency development (training) plan
    - qualification structure encompassing:
      - scope of work
      - Training Packages – UEE Electrotechnology
      - units of competency
      - structure of qualification
      - off-the-job requirements
      - on-the-job requirements
    - responsibilities of parties to the contract encompassing:
      - employer responsibilities
      - learner responsibilities
      - RTO responsibilities
      - State/Territory Training Authorities (STAs)
    - electrotechnology industry career opportunities encompassing:
      - industry areas
      - qualification levels
      - career paths
    - industry customs and practices encompassing:
      - industry bodies – employer and employee representatives
      - regulatory bodies – including licensing/registration, WHS/OHS, industrial relations (IR), training authorities – apprentice/trainee regulation
      - VET system – Australian Qualification Framework (AQF) and credentials
    - monitoring of workplace evidence encompassing:
      - workplace exposure and practices and relationship with units of competency
      - methods of collecting workplace evidence
      - monitoring period cycle
      - requirements of workplace evidence
      - actions taken for unsatisfactory progression
      - role of STA
      - apprentice/learner responsibilities

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    - employer responsibilities
- RTO policies encompassing:
    - apprentice/learner responsibilities
    - teacher/trainer responsibilities
    - absenteeism
    - off-the-job component assessment specifications
    - on-the-job component assessment specifications
    - qualification completion requirements and award
    - advanced standing and/or recognition of prior learning (RPL)
    - result review procedures
- apprentice/learner discipline policy encompassing:
    - apprentice/learner rights
    - apprentice/learner responsibilities
    - breaches of discipline
    - types of penalties
- attendance at the RTO encompassing:
    - importance of attendance
    - record management of attendance
    - attendance cards
    - advice to employer of absences
- fire and emergencies at the RTO encompassing:
    - designated fire and emergency exits
    - procedures in the event of a fire
    - evacuation procedures
    - assembly points
- WHS/OHS at the RTO encompassing:
    - eye protection
    - foot protection
    - protective clothing
    - personal injuries
    - mobile phones and personal belongings
    - dress regulations
    - rotating machinery
    - designated fire and emergency exits
- entry requirements encompassing:
    - numeracy requirements
    - literacy requirements
    - RTO support mechanisms
- RTO tour encompassing:

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    - RTO layout
    - building layout
    - tour of building and RTO
- methods of monitoring and reporting competency development activities encompassing:
    - RTOs responsibility to receive and monitor workplace activities of the apprentice/learner
    - industry requirements for monitoring workplace evidence
    - acceptable methods for monitoring and reporting workplace activities
    - apprentice's/learner's responsibility to participate in the reporting of workplace activities
    - RTOs requirements in periodically evaluating development of apprentices/learners from the workplace activities information gathered, and providing feedback and advice on areas requiring improvement
    - employer responsibilities to participate in monitoring, reporting and confirming workplace activities, and assisting in overcoming areas requiring development by the apprentice/learner
    - options for appeal or assistance from RTO and STA
- enterprise work activities policies and procedures encompassing:
    - need for policies and procedures
    - scope for an industry/enterprise to establish work activity policies and procedures - policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development
    - following work activities procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECO0025 Provide quotations for inspection and compliance audit services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide quotations for inspections and compliance audit services.

It includes planning, developing, documenting and submitting quotations. It also includes reading job specifications, pricing labour and site costs, completing quotation documentation and applying customer communication protocols.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Commercial

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine extent of audit services work	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified
	1.2 Hazards are identified, risks are assessed and control

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		measures implemented
	1.3	Extent of inspection or audit service work is determined from job specifications and drawings and discussions with appropriate person/s
	1.4	Extent of inspection or audit service work is documented as a job specification and agreement sought with relevant person/s
	1.5	WHS/OHS and regulatory requirements are incorporated in the work contained in quotation
	1.6	Timeframes specified in quotations are agreed with relevant person/s
2 Develop audit services quotation	**2.1**	Labour and other costs are determined from relevant workplace documentation
	2.2	Costing is performed and checked against job specifications
	2.3	Costings used in job specifications and quotations are checked for accuracy
3 Document and submit quotation	**3.1**	Quotation is documented in accordance with workplace procedures
	3.2	Quotation is submitted to customer within agreed timeframes and in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing at least one quotation for an inspection job and one for a compliance audit must include quotation jobs not exceeding	• automation technologies • computers • data communications

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$20,000 for any of the following electrotechnology disciplines:	• electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEC009B Provide quotations for inspection and compliance audit services.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECO0025 Provide quotations for inspection and compliance audit services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupation health and safety (OHS) requirements, including implementing risk control measures
- checking quotations
- complying with timeframes
- costing jobs
- determining labour and other relevant costs
- documenting and submitting quotations
- determining extent of work for quotation
- planning and developing quotations
- reading job specifications and drawings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- communication protocols
- compliance audit services
- job specifications
- labour costs and other relevant costs
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0001 Administer computer networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to administer computer networks.

It includes working safely; planning server installations and upgrades; planning for infrastructure services roles; determining and maintaining user and group permissions, delegated administration, network security and shared resource management; monitoring and maintaining servers for performance evaluation and optimisation, terminal server infrastructure and application deployment; planning for business continuity and high availability; and documenting all administration activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install, upgrade and maintain network operations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of the network is determined from network specifications and in consultation with relevant person/s
	1.3	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.4	Network operating system versions and updates required to maintain the network are obtained in accordance with workplace procedures and network requirements
2 Administer network operations and document activities	**2.1**	Server operating systems are installed, upgraded and configured in accordance with developer instructions and network requirements
	2.2	Devices and drivers, desktop environment, network protocols, and services and system security are implemented in accordance with requirements
	2.3	Access to resources is configured within the limitations specified for each user
	2.4	Network malfunctions are identified and rectified using logical techniques and knowledge of devices and driver storage network protocols, connections and services and system security configuration processes
	2.5	Network performance and reliability is monitored and optimised in accordance with established procedures
	2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.7	Network administration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or other services
	2.8	Written justification is produced for network maintenance and upgrade and appropriate person/s notified in accordance with established procedures
	2.9	Network administration and documentation are maintained in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED115A Administer computer networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0001 Administer computer networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety /occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out network administration without waste of materials and energy or damage to apparatus, the surrounding environment or other services
- dealing with unplanned events
- determining network requirements and operating system versions and updates
- documenting network administration activities
- identifying and rectifying network malfunctions
- implementing devices and drivers, desktop environment, network protocols, services and system security
- installing, upgrading and maintaining network operations
- installing, upgrading and configuring server operating system in accordance with network requirements
- monitoring and maintaining server performance evaluation and optimisation, and monitoring and maintaining security and policies
- obtaining network operating system versions and updates required to maintain the network
- preparing to install, upgrade and maintain network operations
- optimising network performance, including implementing a patch management strategy, monitoring servers for performance evaluation and optimisation, removing redundant components and maintaining storage capacity, and monitoring and maintaining security and policies
- installing and configuring domain name system (DNS) servers, creating and configuring DNS zones and records
- installing and configuring dynamic host configuration protocol (DHCP) and managing and maintaining DHCP
- implementing network connectivity solutions, implementing network address translation (NAT), configuring routing and implementing virtual private network (VPN)
- implementing network policy server; configuring a RADIUS server, including RADIUS proxy; and configuring RADIUS clients

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- implementing IPv4 and IPv6 addressing
- implementing high performance network solutions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- application and data provisioning
- business continuity and high availability
- network operating system versions and updates
- new deployment, complete version upgrade, incremental updates, and security and bug patches
- problem-solving techniques
- relevant devices and drivers, desktop environment, network protocols, services and system security
- relevant industry standards
- relevant manufacturer specifications and installation instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- server deployment
- server management.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to administering user networks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0002 Analyse and implement biometric measuring techniques and applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse and implement biometric measuring techniques and applications.

It includes analysing and implementing the various biometric techniques and applications implemented in the field of biometric measurements and evaluating biometric system from enrolment phase. It also includes working safely, following instructions, evaluating performance and documenting outcomes.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse and implement biometric techniques and applications	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Technical requirements for the design and system rollout in criminal, civil and commercial settings are identified
	1.3	Scope of biometric system work requirements for implementation and system rollout are identified in accordance with workplace procedures
	1.4	Existing and planned technical and environmental requirements are evaluated and documented in accordance with workplace procedures
	1.5	Work team/group is assembled of relevant persons in accordance with work requirements and workplace procedures
	1.6	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.7	Correct operation and safety of software, tools, equipment and testing devices required to carry out work are obtained and checked in accordance with relevant industry standards
	1.8	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system and confirmation documented in accordance with workplace procedures
2 Analyse and implement biometric systems	**2.1**	Technology and implementation processes are applied with biometric systems in analysing and implementing biometric techniques and applications in accordance with workplace procedures
	2.2	Performance of landline versus mobile telephony in association with biometric systems is analysed and evaluated in accordance with workplace procedures
	2.3	Safety, functional and budgetary requirements are incorporated in the installation design plan, analysed and evaluated in accordance with workplace procedures and relevant industry standards
	2.4	Hardware and software required for biometric system are analysed and implemented in accordance with the design plan and workplace procedures
	2.5	Relevant industry standards and/or codes of practice are

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		used to evaluate compliance in accordance with workplace procedures and relevant industry standards
	2.6	Practical aspects and limitations of biometric system implementation are demonstrated through the use of multi-biometrics
	2.7	Location of device/s in the installation of the biometric system is tested for correct operation of system functions and documented in accordance with workplace procedures
	2.8	Unplanned situations are responded to in accordance with relevant industry standards and workplace procedures
3 Report on biometric system analysis and implementation	**3.1**	Hardware and software required for the biometric system are analysed in accordance with WHS/OHS requirements, relevant industry standards and workplace procedures
	3.2	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	3.3	Implemented system analysis techniques of biometric systems are used to identify system malfunctions
	3.4	Issues/problems are analysed to provide effective solutions in accordance with workplace procedures
	3.5	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Analysing and implementing a biometric system must include at least two of the following features:	• analysis and evaluation development process • target enrolment • identification and verification • system installation requirements • software • equipment requirements and instructions

Unit Mapping Information

This unit replaces and is equivalent to UEENEED154A Analyse and implement biometric measuring techniques and applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0002 Analyse and implement biometric measuring techniques and applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing and implementing biometric techniques and applications
- analysing and implementing hardware and software required for biometric system
- applying relevant industry standards and/or codes of practice
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements. including using risk control measures
- assembling work group/team
- dealing with unplanned situations
- documenting and recording results in accordance with workplace procedures
- evaluating technology techniques and applications for biometric use
- identifying technical requirements for the design and system rollout in criminal, civil and commercial settings
- incorporating safety, functional and budgetary requirements into installation design plan, analysis and evaluation
- preparing to analyse and implement biometric systems
- reporting on biometric system analysis and implementation
- testing and documenting correct operation of system functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- forms of automatic data capture, advantages and disadvantages
- functional design and construction of a simple system
- interfacing issues between systems involving different hardware and software
- problem-solving techniques
- relevant criminal, civil and commercial settings
- relevant hardware, software, tools, equipment and testing devices

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- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budgets, timelines, policies and procedures
- relevant workplace documentation
- technical principles, parameters and processes underpinning each biometric system technology in identity and verification recognition
- typical selection, evaluation and testing criterion and methods of biometrics systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to analysing and implementing a biometric system for in field use
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0003 Assemble, set up and test computing devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble, set up and test computing devices.

It includes applying safe working practices; checking computer components; assembling components; installing and testing operating system, drivers and application software; following instructions and completing work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Assemble computing devices	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in relation to computer and keyboard use are

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		followed
	1.3	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.4	Computer components, operating system, application software and testing devices are obtained in accordance with workplace procedures and relevant industry standards
	1.5	Computer components are assembled and connected in accordance with manufacturer instructions
	1.6	Quality checks are carried out in accordance with workplace procedures and instructions
	1.7	Unplanned events are referred to supervisor for directions
2 Install operating system and application software	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Hardware requirements are determined for operating system to be installed in accordance with workplace procedures and application instructions
	2.3	Computer start-up instructions for installation of the operating system, drivers and network interfaces to default configuration are followed in accordance with workplace procedures and application instructions
	2.4	Application software is installed to default configuration in accordance with application instructions
	2.5	Authentication, data security, integrity, antivirus and logins are implemented on computing device
	2.6	Computer shutdown procedures are followed
	2.7	Quality checks are carried out in accordance with workplace procedures and application instructions
	2.8	Workplace procedures for referring non-routine events to immediate supervisor for directions are followed in accordance with workplace procedures
3 Test computer operation	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed in accordance with workplace procedures and instructions

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	3.2	Computer start-up procedures are followed and checked in accordance with application instructions
	3.3	Computer network operating system and application programs are tested and operated correctly in accordance with application instructions and workplace procedures
	3.4	Faults are identified of hardware and/or software in accordance with workplace procedures
	3.5	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	3.6	Faults are rectified in accordance with workplace procedures and application instructions
	3.7	Workplace procedures for referring non-routine events to immediate supervisor for directions are followed in accordance with workplace procedures
	3.8	Computer shutdown procedures are followed in accordance with workplace procedures and application instructions
	3.9	Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
4 Complete work and report	**4.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	4.2	Work area is cleaned and made safe in accordance with workplace procedures
	4.3	Work supervisor is notified of the completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED102A Assemble, set-up and test computing devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0003 Assemble, set up and test computing devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- assembling and connecting computing devices components
- carrying out quality checks
- completing and reporting work
- determining hardware requirements for operating system to be installed
- determining to test and measure live work
- following computer shutdown workplace procedures
- following computer start-up instructions
- identifying and rectifying hardware and/or software faults
- installing application software to default configuration.
- obtaining computer components, operating system and application software
- referring unplanned events to supervisor for directions
- seeking advice from work supervisor to ensure work is coordinated
- testing computer network operation
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques
- relevant assembling and dismantling techniques
- relevant authentication and file and directory security
- relevant computer components, operating system, application software and testing devices
- relevant hardware faults and troubleshooting techniques

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- relevant manufacturers specifications and operating instructions
- relevant network hardware and components
- relevant operating system installation and configuration
- relevant operating systems in use
- relevant repair techniques
- relevant job safety assessments or risk mitigation processes
- relevant set-up of standard network configuration
- relevant WHS/OHS legislated requirements, including:
  - computing device assembly/disassembly
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures
- sustainable energy principles
- testing and measuring live work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to assembling, setting up and testing personal computers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0004 Commission industrial computer systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to commission industrial computer systems.

It encompasses applying safe working practices, testing system parameters, adjusting to assure optimum performance, following workplace procedures, and documenting final adjustment parameters and settings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission computer systems	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.5 System operating parameters are identified by reviewing system specifications and component technical data
	1.6 Tools, equipment, applications and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures
	1.8 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Commission computer systems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Testing/measuring devices are connected and set up in accordance with relevant industry standards
	2.3 Measurements and adjustments are made to computer equipment to provide optimum system performance in accordance with system specifications and/or relevant industry standards
	2.4 Decisions for dealing with unplanned situations are dealt with in consultation with relevant person/s and job specifications in accordance with relevant industry standards

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	2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.6	Systems commissioning workplace procedures are performed in accordance with relevant industry standards
	2.7	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report commissioning activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Adjustment settings are documented in accordance with workplace procedures
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Commissioning results and work completion are notified to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning industrial computer systems must include at least two of the following:	• different types of computer systems • associated components • controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEED144A Commission industrial computer

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systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0004 Commission industrial computer systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- checking and isolating circuits
- checking work to ensure no damage and/or waste to apparatus, environment, materials and services
- commissioning systems in accordance with workplace procedures
- connecting and setting up testing/measuring devices
- dealing with unplanned events in consultation with relevant person/s and job specifications
- consulting with relevant person/s to ensure work is coordinated effectively
- documenting adjustment settings in accordance with workplace procedures
- identifying system performance parameters by reviewing system specifications and component technical data
- measuring and adjusting computer equipment to provide optimum system performance
- obtaining tools, equipment, applications and testing devices required for work
- preparing to commission computer systems
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant commissioning, including:
  - commissioning, planning and documentation
  - purpose of commissioning
  - workplace procedures for commissioning systems

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- relevant industrial computer systems
- relevant industry standards
- relevant manufacturer specifications and installation instructions
- relevant materials, apparatus, environment and services
- relevant job safety assessments or risk mitigation processes
- relevant system operating parameters
- relevant tools, equipment, applications and testing/measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to commissioning computer systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0005 Design and implement advanced routing for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement advanced routing for internetworking systems.

It includes working safely, applying design principles, complying with relevant industry standards, incorporating advanced configuration of remote access, documenting design and monitoring performance.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design **i**nternetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for advanced routing is developed and documented in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Strategies are implemented to ensure network development is in accordance with design brief and workplace procedures
2 Design internetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Advanced routing technologies are included in the internetworking system design in accordance with relevant industry standards and workplace procedures
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace procedures
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace procedures
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace procedures and timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in accordance with design brief and relevant industry

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standards

3.3 Advance routing technologies are installed, configured and tested in accordance with design brief and relevant industry standards

3.4 System malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace procedures

3.6 Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing internetworking systems - advanced routing must include at least the following:	• between two local area networks (LANs) to form a wide area network (WAN) or • between a LAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED119A Design and implement advanced routing for internetworking systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0005 Design and implement advanced routing for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- arranging work team/group of relevant persons
- dealing with unplanned events
- designing advanced routing based on economic and effective solutions that meet design brief requirements
- designing internetworking system with economical design solutions
- detailing advanced routing technologies and specifications for internetworking media in the design
- developing a design brief for advanced remote access technologies in an internetworking system
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing strategies to ensure network development
- implementing internetworking system design
- implementing internetworking systems, including advanced wireless local area network (LAN) technologies in internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning work activities, including requirements for work team/group
- preparing to design internetworking systems
- presenting and discussing internetworking system design with relevant person/s
- acquiring media for internetworking system design specification
- selecting relevant development tools and software.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- default route
- multi-protocol routing
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications
- relevant media
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, instructions, quality, policies and procedures
- relevant workplace documentation
- routing process
- routing protocols in current use
- scalable internet protocol (IP) addresses.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and implementing internetworking systems – advanced routing
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEECS0006 Design and implement multi-layer switching for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement multi-layer switching for internetworking systems.

It includes working safely, applying design principles, complying with relevant industry standards, incorporating advanced multi-layer switching technologies access, documenting design and monitoring performance.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for advanced multi-layer switching technologies is developed and documented in accordance with workplace procedures and in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Strategies are implemented to ensure network development is in accordance with design brief and workplace procedures
2 Design **i**nternetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Advanced multi-layer switching technologies are included in internetworking system design in accordance with relevant industry standards and workplace procedures
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace procedures
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace procedures
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in

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accordance with design brief and relevant industry standards

3.3 Advance routing technologies are installed, configured and tested in accordance with design brief and relevant industry standards

3.4 System malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace procedures

3.6 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing advanced configuration of multi-layer switching in an internetworking system must include at least the following:

- between two local area networks (LANs) to form a wide area network (WAN) or
- between a LAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED121A Design and implement multi-layer switching for Internetworking systems.

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Links

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Assessment Requirements for UEECS0006 Design and implement multi-layer switching for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- arranging work team/group of relevant persons
- dealing with unplanned events
- designing internetworking systems with economical design solutions
- detailing multi-layer switching technologies and specification for internetworking media in the design
- developing a design brief for multi-layer switching technologies in an internetworking system
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing strategies to ensure network development
- implementing internetworking system design
- implementing internetworking systems, including advanced wireless local area network (LAN) technologies in internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning work activities, including requirements for work team/group
- preparing to design internetworking systems
- preparing to design internetworking systems
- presenting and discussing internetworking system design with relevant person/s
- acquiring media for internetworking system design specification
- selecting relevant development tools and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- campus network design
- controlling access to the campus network
- fast layer 2 services
- inter virtual local area networks (VLAN) routing
- managing network traffic
- managing redundant links
- multi-cast
- problem-solving techniques
- relevant development tools and software
- relevant industry standards
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budgets, instructions, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and implementing multi-layer switching internetworking systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0007 Design and implement network systems for internetworking

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement network systems for internetworking.

It includes safe working practice, applying design principles, using wide area network (WAN) technologies, complying with relevant industry standards, and documentation of design and performance monitoring.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for internetworking is developed and documented in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Strategies are implemented to ensure network development is in accordance with design brief and workplace procedures
2 Design internetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Switching routing and WAN technologies are included in the internetworking system design in accordance with relevant industry standards and workplace procedures
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace procedures
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace procedures
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace procedures, timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in accordance with design brief and relevant industry standards

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3.3 Switching routing and WAN technologies are installed, configured and tested in accordance with design brief and relevant industry standards

3.4 System malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace procedures

3.6 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing internetworking systems must include at least the following:	• between two local area networks (LANs) to form a wide area network (WAN) or • between a LAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED118A Design and implement network systems for internetworking.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0007 Design and implement network systems for internetworking

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements
- arranging work team/group of relevant persons
- dealing with unplanned events
- designing internetworking system based on economic and effective solutions that meet design brief requirements
- designing internetworking system with economical design solutions
- detailing switching, routing and wide area network (WAN) technologies and specification for internetworking media in the design
- developing an internetworking system design brief
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing strategies to ensure network development
- implementing internetworking system design, including advanced wireless local area network (LAN) technologies in internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning work activities, including requirements for work team/group
- preparing to design internetworking systems
- presenting and discussing internetworking system design with relevant person/s
- troubleshooting internetworking system
- acquiring media for internetworking system design specification
- selecting relevant development tools and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- access lists configuration
- configure dynamic host configuration protocol (DHCP) service
- configure inter-virtual local area network (VLAN) routing
- configure spanning tree protocol
- configure VLAN trunking protocol
- design report presentation
- interior gateway protocol (IGP) configuration
- LAN design
- network performance assessment
- network security and risk management
- problem solving techniques
- relevant industry standards
- relevant manufacturer specifications
- relevant media
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, instructions, quality, policies and procedures
- relevant workplace documentation
- switch configuration
- VLAN configuration
- VLAN design
- WAN design
- WAN management and security
- WAN protocols
- WAN technologies
- wireless LAN configuration
- troubleshoot multi-VLAN issues
- layer 3 switching
- link aggregation and router redundancy
- dynamic routing
- interior gateway protocol (IGP) tuning and troubleshooting
- WAN monitoring
- quality of service
- network evolution
- network troubleshooting
- emerging technologies.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and implementing internetworking systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0008 Design and implement remote access for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement remote access for internetworking systems.

It includes working safely, applying design principles, complying with relevant industry standards, incorporating advanced configuration of remote access, documenting design and monitoring performance.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for advanced remote access is developed and documented in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Strategies are implemented to ensure network development is in accordance with design brief and workplace procedures
2 Design internetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Advanced remote access technologies are included in the internetworking system design in accordance with relevant industry standards and workplace procedures
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace procedures
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace procedures
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace procedures, timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in accordance with design brief and relevant industry standards

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3.3 Advance routing technologies are installed, configured and tested in accordance with design brief and relevant industry standards

3.4 System malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace procedures

3.6 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing internetworking system - remote access technologies must include at least the following:	• between two local area networks (LANs) to form a wide area network (WAN) or • between a LAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED120A Design and implement remote access for Internetworking systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0008 Design and implement remote access for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- arranging work team/group of relevant persons
- dealing with unplanned events
- designing internetworking system with economical design solutions
- detailing with advanced remote access technologies and specifications for internetworking media in the design
- developing a design brief for advanced remote access technologies in an internetworking system
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing strategies to ensure network development
- implementing internetworking system design, including advanced wireless local area network (LAN) technologies in internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning work activities, including requirements for work team/group
- preparing to design internetworking systems
- presenting and discussing internetworking system design with relevant person/s
- acquiring media for internetworking system design specification
- selecting relevant development tools and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- asynchronous on-demand wide area network (WAN) services
- control of corporate network access
- network devices and feature sets used for remote access networks
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications
- relevant media
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, instructions, quality, policies and procedures
- relevant workplace documentation
- scaling remote access networks with network address translation (NAT) and port address translation (PAT)
- synchronous and leased WAN connectivity
- troubleshooting the remote access network.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and implementing remote access internetworking systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0009 Design and implement security for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement security for internetworking systems.

It includes working safely, applying design principles, complying with relevant industry standards, incorporating advanced security technologies, documenting design and monitoring performance.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for advanced security technologies is developed and documented in accordance with workplace procedures and in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Strategies are implemented to ensure network development is in accordance with design brief and workplace procedures
2 Design internetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Advanced security technologies are included in internetworking system design in accordance with relevant industry standards and workplace security policy
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace security policy
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace security policy
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace security policy
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace security policy for timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in

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accordance with design brief and relevant industry standards

3.3 Advanced routing technologies are installed, configured and tested in accordance with design brief and relevant industry standards

3.4 System malfunctions are identified and rectified using techniques in accordance with workplace security policy and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace security policy

3.6 Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance with workplace security policy

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing security for internetworking systems must include at least the following:

- between two local area networks (LANs) to form a wide area network (WAN) or
- between a LAN and the internet.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED122A Design and implement security for Internetworking systems.

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Links

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Assessment Requirements for UEECS0009 Design and implement security for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one or more separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- arranging work team/group of relevant persons
- dealing with unplanned events
- designing internetworking system with economical design solutions
- developing a design brief for advanced security technologies in an internetworking system design brief
- developing a disaster recovery plan
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning work activities including requirements for work team/group
- presenting and discussing internetworking system design with relevant person/s
- selecting relevant development tools and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- access control lists (ACLs)
- ACLs for firewalls
- cryptographic services
- virtual private network (VPN)
- firewalls

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- internet protocol (IP) security
- intrusion detection systems (IDS)
- network security testing
- relevant network security industry standards
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- network security policies
- secure network design
- securing perimeter routers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and implementing security for internetworking systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0010 Design and implement wireless LANs/WANs for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and implement wireless local area networks (LANs)/wide area networks (WANs) for internetworking systems.

It includes working safely, applying design principles, complying with relevant industry standards, incorporating advanced wireless LAN/WAN technologies, and documenting design and performance monitoring.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of design brief for advanced wireless LAN/WAN technologies is developed and documented in consultation with relevant person/s
	1.3	Work team/group is arranged of relevant persons in accordance with design brief and workplace procedures
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
2 Design internetworking systems	**2.1**	Internetworking system is designed with economical design solutions in accordance with design brief, relevant industry standards and workplace procedures
	2.2	Advanced wireless LAN/WAN technologies are included in internetworking system design in accordance with relevant industry standards and workplace procedures
	2.3	Internetworking system design specification of required media is in accordance with relevant industry standards
	2.4	Internetworking system design is documented in accordance with workplace procedures
	2.5	Internetworking system design is presented and discussed with relevant person/s in accordance with workplace procedures
	2.6	Alterations to the internetworking system design resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.7	Final internetworking system design is documented and approval obtained from relevant person/s in accordance with workplace procedures
3 Implement internetworking systems	**3.1**	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	3.2	Relevant development tools and software are selected in accordance with design brief and relevant industry standards
	3.3	Advance wireless LAN/WAN technologies are installed, configured and tested in accordance with design brief

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and relevant industry standards

3.4 System malfunctions and performance issues are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards

3.5 Unplanned events are analysed to provide solutions in accordance with workplace procedures

3.6 Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards

3.7 Final internetworking system design and implementation are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and implementing wireless LANs/WANs internetworking systems must include at least the following:	• between two LANs/wireless local area network (WLANs) to form a WAN, or a WLAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED123A Design and implement wireless LANs/WANs for internetworking systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0010 Design and implement wireless LANs/WANs for internetworking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- acquiring media for internetworking system design specification
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements
- conducting wireless local area network (WLAN) maintenance and troubleshooting
- configuring and testing a controller-based WLAN
- configuring and testing WLAN security
- designing internetworking system with economical design solutions
- developing a design brief for advanced wireless local area network (LAN)/wide area network (WAN) technologies in an internetworking system design brief
- documenting and presenting design for approval
- documenting internetworking installation and configuration activities
- identifying and rectifying system malfunctions and performance issues
- implementing internetworking system design, including advanced wireless LAN/WAN technologies in internetworking system design
- monitoring quality of work
- negotiating alterations to internetworking system design
- planning and conducting a site survey for setting up a wireless network
- preparing to design wireless internetworking system
- selecting relevant development tools and software
- using technologies and media specifications used in the design of advanced wireless LAN/WAN technologies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- access points

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- advanced wireless LAN/WAN technologies
- antennas
- application design and site survey preparation
- authentication and encryption methods
- emerging technologies
- radio frequency (RF) fundamentals
- relevant industry standards
- relevant manufacturer specifications
- relevant media
- security
- troubleshooting, management, monitoring and diagnostics
- wireless bridges and routers
- wireless LAN/WAN network management software tools
- wireless radio technologies
- wireless roaming
- wireless standards
- wireless topologies
- WLAN architecture and devices
- WLAN implementation and deployment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0011 Design and manage enterprise computer networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and manage enterprise computer networks.

It includes safe working practices, the design and management of network and application services, core identity and access management components, directory services infrastructure components, designing physical and logical directory service topologies, designing for business continuity and data availability, and documenting all design and management activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Develop design for a network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of the network design is determined from design brief and/or in consultation with relevant person/s
	1.3	Business requirements for existing and projected business model, organisational and information technology management structures are analysed in accordance with workplace procedures
	1.4	Design is developed to include business priorities, growth, growth strategy, regulatory framework, risk and relevant cost in accordance with workplace
	1.5	Existing and planned technical and environment goals of the enterprise are evaluated and documented in accordance with workplace procedures and design specifications
	1.6	Design is developed with relevant technical factors in accordance with workplace procedures and design specifications
	1.7	Client access, end-user needs and usage patterns, and disaster recovery requirements are evaluated and documented
	1.8	Design specifications, analysis and evaluations are documented in accordance with workplace procedures and design specifications
	1.9	Network specification is presented and discussed with relevant person/s
	1.10	Alterations to the network specification resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
2 Design a network	**2.1**	Alternative network infrastructures and technologies are applied to network design
	2.2	Network design is developed with required wide area network (WAN) infrastructure, internet connectivity, and implementation and management strategies
	2.3	Risk management strategies are sought, obtained and incorporated into the network design
	2.4	Network design is reviewed and adjusted to rectify any anomalies in accordance with workplace procedures

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	2.5	Network design proposal is documented in accordance with workplace procedures
	2.6	Network design is presented and discussed with relevant person/s
	2.7	Alterations to network design from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	2.8	Optimised project charter design is documented and approval obtained from relevant person/s
3 Implement and manage a network	**3.1**	Server and client systems are installed and configured in accordance with design specifications and network industry standards
	3.2	User and group objects security is implemented in accordance with network specifications
	3.3	Directory services, data storage, shared resources, web, remote access and network security are managed to ensure operation of the network is in accordance with workplace procedures and design specifications
	3.4	Issues/problems are analysed to provide effective solutions in accordance with workplace procedures and design specifications
	3.5	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
4 Diagnose network malfunctions	**4.1**	Network operation is monitored using network diagnostic tools and malfunctions are diagnosed to determine cause in accordance with workplace procedure and design specifications
	4.2	Network malfunctions are rectified using appropriate tests of the network in accordance with workplace procedures
	4.3	Approaches to issues/problems are analysed to provide most effective solutions
	4.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
5 Report network management activities	**5.1**	Finalised project charter documentation is written and forwarded to relevant person/s in accordance with

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workplace procedures

5.2 Network service records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED114A Design and manage enterprise computer networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0011 Design and manage enterprise computer networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- analysing business requirements
- analysing technical requirements
- analysing resources, services, network infrastructure, protocols and hosts, transmission control protocol and internet protocol (IP) hardware, planned upgrades, support and network and systems management
- applying alternative network infrastructures and technologies to network design
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- designing a network in accordance with design specifications and relevant industry standards
- diagnosing and rectifying the cause of network malfunctions
- documenting justification for network solutions
- evaluating and documenting client access, end-user needs and usage patterns, and disaster recovery requirements
- implementing and managing an enterprise network
- implementing network design
- obtaining and incorporating risk management strategies
- obtaining approval for network design specification
- presenting network specification
- reporting network management activities
- configurating of user and group objects, groups configuring accounts via a directory service, searching for objects, use of templates for creating user accounts and resetting accounts
- installing and configuring domain name system (DNS) servers, and creating and configuring DNS zones and records
- installing and configuring dynamic host configuration protocol (DHCP), managing and maintaining DHCP, implementing and maintaining IP address management
- implementing network connectivity solutions, implementing network address translation (NAT) and configuring routing
- implementing network policy server and configuring a RADIUS server, including RADIUS proxy
- implementing IPv4 and IPv6 addressing and implementing distributed file system

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- implementing high performance network solutions
- determining scenarios and requirements for implementing software-defined networking (SDN).

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- design network considering company size, user and resource distribution, various site connectivity, bandwidth, service performance, availability and scalability, data and system access patterns, network roles and responsibilities and security considerations
- design and management of DHCP
- design and management of DNS
- design of network connectivity and remote access solutions
- design of core and distributed network solutions
- design of an advanced network infrastructure design and manage business continuity and data availability
- design and manage identity management components
- plan for network and application services
- problem-solving techniques
- relevant business requirements
- relevant manufacturer specifications and operating instructions
- relevant network diagnostic tools
- relevant network infrastructures
- relevant risk management strategies
- relevant technical requirements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including network design proposal
- relevant workplace instructions, quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to design and management of enterprise computer networks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0012 Design embedded controller control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design embedded controller control systems.

It includes preparing and designing embedded systems. It also includes obtaining approval for designs.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design embedded systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Scope of the proposed embedded system development is determined from the design brief and/or in consultation with relevant person/s
	1.4	Design development work is planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Materials and devices/components required for work are selected on compatibility with embedded system and in accordance with project budget requirements
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Design and develop embedded systems	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Range of embedded devices and systems and compliance standards are considered and applied to the design
	2.3	Alternative arrangements for the design are evaluated in accordance with the design brief
	2.4	Safety, functional and budget considerations are in accordance with the design
	2.5	Prototype devices and circuits are constructed and tested in accordance with the design brief and relevant industry standards
	2.6	Prototype malfunctions are identified, rectified and re-tested in accordance with workplace procedures and design brief
	2.7	Embedded system design is documented and submitted to relevant person/s for approval
	2.8	Unplanned situations are identified and resolution techniques are applied in accordance with workplace procedures
3 Obtain approval for embedded systems design	**3.1**	Embedded system design is presented to client representative and/or relevant person/s
	3.2	Design modifications are negotiated with relevant person/s in accordance with workplace procedures

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3.3 Final design is documented and approval obtained from relevant person/s

3.4 Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and developing an embedded control system must include the following:

- at least three input/output (I/O) devices and/or functions

Unit Mapping Information

This unit replaces and is equivalent to UEENEED152A Design embedded controller control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0012 Design embedded controller control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- constructing and testing prototype devices and circuits
- dealing with unplanned situations in accordance with problem-solving techniques and workplace procedures
- designing and developing embedded systems
- developing alternative designs
- developing the design within safety, functional and budget requirements
- documenting and presenting design
- negotiating design alteration requests
- obtaining approval for embedded systems design
- obtaining approval for final design
- preparing to design and develop embedded systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant materials, tools, equipment and testing devices and components
- relevant microprocessor assembly language and high-level language programming, including:
  - complex data types and structures
  - central processing unit (CPU) architecture
  - documentation
  - interfacing high-level languages to assembler

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  - interrupt service routines
  - modular programming
  - processor and system support
- relevant problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing embedded controller systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0013 Develop and validate biometric equipment/systems installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop and validate biometric equipment/systems installation.

It includes working safely, identifying operating parameters, following instructions, validating biometric equipment/systems installation and documenting outcomes.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop and validate biometric equipment/systems installation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Technical factors relevant to the system installation in

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		criminal, civil and commercial settings are identified
	1.3	Scope of the biometric system installation and factors affecting the integration and application of proprietary or open source packages are identified and evaluated in accordance with workplace procedures
	1.4	Existing and planned technical and environmental requirements are evaluated and documented in accordance with workplace procedures
	1.5	Work team/group is assembled of relevant persons in accordance with work requirements and workplace procedures
	1.6	Existing and projected business model, organisational and information technology management structures and legal aspects of biometrics are analysed in accordance with workplace procedures and relevant industry standards
	1.7	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.8	Correct operation and safety of software, tools equipment and testing devices required to carry out work are obtained and checked in accordance with relevant industry standards
	1.9	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system and confirmation documented in accordance with workplace procedures
2 Develop and validate biometric equipment/systems installation with relevant instructions	**2.1**	Biometric system is developed with relevant technology of biometric systems, information technology, network security, installation performance standards, compliance methods and service equipment in accordance with workplace procedures and relevant industry standards
	2.2	Development process for installation, equipment, instructions and validation requirements of the biometric system are evaluated in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functional and budgetary requirements are incorporated in the installation plan, analysed and evaluated in accordance with workplace procedures and

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		relevant industry standards
	2.4	Equipment required for the biometric system are validated in accordance with the biometric system installation and workplace procedures
	2.5	Australian and international standards and/or codes of practice are used to evaluate compliance
	2.6	Status and parameters of function system devices are entered in accordance with workplace procedures, manufacturer instructions and work requirements
	2.7	Location of device/s in the installation of the biometric system is tested for correct operation of system functions and documented in accordance with workplace procedures
	2.8	Unplanned situation/s are responded to in accordance with relevant industry standards and workplace procedures
3 Validate and report on biometric equipment/systems installation	**3.1**	Biometric system is tested in accordance with WHS/OHS requirements, relevant industry standards and workplace procedures
	3.2	Operating anomalies are identified and reported in accordance with workplace procedures
	3.3	System malfunctions are identified during testing using techniques in accordance with relevant industry standards and workplace procedures
	3.4	Approaches to solving issues/problems are analysed to provide most effective solutions
	3.5	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing biometric system installation, instructions and validating requirements of biometric equipment/systems must include at least two of the following features:

- securing computer networks
- database design
- measurement of a biometric system
- equipment requirements and instructions

Unit Mapping Information

This unit replaces and is equivalent to UEENEED155A Develop and validate biometric equipment/systems installation.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0013 Develop and validate biometric equipment/systems installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards and/or codes of practice
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- assembling work group/team
- correcting system anomalies effectively
- dealing with unplanned situations
- developing and validating biometric equipment/systems installation with relevant instructions
- documenting and recording results in accordance with workplace procedures
- entering functions and parameters correctly
- identifying equipment requirements and instructions
- evaluating operating functions and parameters
- evaluating technology techniques and applications
- identifying technical requirements for the design and system rollout in criminal, civil and commercial settings
- incorporating safety, functional and budgetary requirements into installation design plan, analysis and evaluation
- preparing to develop and validate biometric equipment/systems installation
- selecting appropriate equipment
- testing and verifying system operation
- validating and reporting on biometric equipment/systems installation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- compliance requirements for assuring information technology network security and capital planning measures

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- compliance requirements for implementing security on personal computers and computer networks
- compliance requirements for securing voice over the internet
- deployment principles for rollout of biometrics systems
- laws, standards and compliance guidelines
- measurement of a biometric system
- problem-solving techniques
- relevant criminal, civil and commercial settings
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant software, tools equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security implementation
- technical principles, parameters and processes in identity recognition
- technology applications used in forensics, genetics, civil and commercial environments and government departments for verification of identities
- typical selection, evaluation and testing criterion and methods of biometrics equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing and validating biometric equipment/systems installation
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0014 Develop computer network services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop computer network services.

It includes applying safe working practices, planning network services, installing and configuring network infrastructure components update services, monitoring performance and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop network services	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Scope of network services for development is determined from network performance specifications and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Development tools and software are selected based on specified requirements and performance standards
	1.6	Strategies are implemented to ensure network development is carried out efficiently
2 Install, configure and manage network services	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Complexities of network infrastructure are applied to developing network services
	2.3	Network infrastructure components in use and installed are configured and variants specified for the network in accordance with relevant industry standards
	2.4	Management components of network services are configured and requirements specified for the network are in accordance with relevant industry standards
	2.5	Security components of network services are created and requirements specified for the network are in accordance with relevant industry standards
	2.6	Network malfunctions are identified and rectified using techniques in accordance with relevant industry standards
	2.7	Network is monitored and solutions developed to optimise network performance and reliability in accordance with workplace procedures
	2.8	Approaches to issues/problems are analysed to provide effective solutions
	2.9	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Report network administration activities	**3.1**	Written justification is produced for network services development activities and relevant person/s notified in accordance with workplace procedures

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3.2 Network service development records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED116A Develop computer network services.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0014 Develop computer network services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- analysing approaches to issues/problems to provide effective solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- configuring management components of network services
- consulting with relevant person/s and planning activities to meet scheduled timelines
- creating security components of network services
- determining the scope of network services for development
- developing solutions to optimise network performance
- documenting justification and network services development activities
- identifying and rectifying network malfunctions
- implementing strategies to ensure network development is carried out effectively
- installing and configuring network infrastructure components
- monitoring quality of work
- preparing to develop network services
- selecting development tools and software based on specified requirements and performance standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- remote access
- file and print services
- configure routing and firewalls
- domain name service (DNS) encompassing
- dynamic host configuration protocol (DHCP)
- internet protocol (IP) version 4 (IPv4) and IP version 6 (IPv6) addresses

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- monitoring and maintaining of network services
- problem-solving techniques
- relevant components, development tools and software
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and installation instructions
- relevant network services and infrastructure
- relevant rectifying malfunctions techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including
  - network service development records
- relevant workplace instructions, quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing network services
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0015 Develop energy sector computer network applications infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop energy sector computer network applications infrastructure.

It includes preparing to install and configuring components for network applications infrastructure. It also includes applying safe working practices and documenting activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop a network applications infrastructure	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Network application infrastructure to be developed is determined from network performance specifications and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures to meet timelines in consultation with others involved
	1.5	Development tools and software are selected in accordance with relevant industry standards and network performance requirements
	1.6	Activities are implemented to ensure network development is carried out efficiently
2 Install and configure components	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Complexities of network applications infrastructure are applied to developing the network
	2.3	Network applications infrastructure components in use and installed are configured for the network in accordance with industry standards
	2.4	Management components of the network applications infrastructure are configured in accordance with relevant industry standards and requirements of the network
	2.5	Security components of the network applications infrastructure are created in accordance with relevant industry standards and requirements of the network
	2.6	Network malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards
	2.7	Network is monitored and solutions are developed to optimise network performance in accordance with workplace procedures
	2.8	Security events are analysed and actions taken in accordance with workplace procedures
	2.9	Unplanned events are identified and resolution techniques are applied in accordance with workplace procedures
	2.10	Quality of work is monitored in accordance with

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		workplace procedures and/or relevant industry standards
3 Complete network activities report/s	**3.1**	Documentation is produced for network services completed activities and relevant person/s notified in accordance with workplace procedures
	3.2	Network applications infrastructure development records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED149A Develop energy sector computer network applications infrastructure.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0015 Develop energy sector computer network applications infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- completing network activity reports
- configuring management components of the network applications infrastructure
- configuring security components of the network applications infrastructure
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining network applications infrastructure to be developed
- developing solutions to optimise network performance.
- documenting network applications infrastructure development activities
- identifying and rectifying network malfunctions
- installing and configuring components
- preparing to develop a network applications infrastructure.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- configuring network application services
- problem-solving techniques
- relevant components of network applications
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant security procedures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing energy sector network applications infrastructure
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0016 Develop energy sector directory services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop energy sector directory services.

It includes applying safe working practices, and installing and configuring directory services infrastructure. It also includes maintaining the directory services environment and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop energy sector directory services	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work

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	1.3	Directory services to be developed are determined from network performance specifications and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Development tools and software are selected based on directory service requirements and network performance specifications
	1.6	Activities are implemented to ensure directory service development is carried out in accordance with workplace procedures
2 Install, configure and manage energy sector directory services	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Complexities of directory services are applied to developing a directory services infrastructure
	2.3	Structural components of directory services are installed and configured in accordance with relevant industry standards and specified for the network
	2.4	Management components of directory services are configured in accordance with relevant industry standards and specified for the network
	2.5	Security components of directory services are created using appropriate policy tools in accordance with relevant industry standards and network requirements
	2.6	Directory service malfunctions are identified and rectified using techniques in accordance with workplace procedures and relevant industry standards
	2.7	Directory services are monitored and solutions are developed for network performance and reliability in accordance with workplace procedures
	2.8	Security events are analysed and actions taken in accordance with workplace procedures
	2.9	Approaches to issues/problems are analysed to provide effective solutions

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	2.10	Quality of work is monitored in accordance with workplace procedures and/or directory service requirements or relevant industry standards
3 Report network administration activities	**3.1**	Justification for directory services development activities are documented and relevant person/s notified in accordance with workplace procedures
	3.2	Directory services development records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED147A Develop energy sector directory services.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0016 Develop energy sector directory services

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- configuring directory services components
- dealing with unplanned events in accordance with workplace procedures and safe work practices
- documenting directory services development activities
- installing and configuring a directory services infrastructure
- installing, configuring and managing energy sector directory services
- preparing to develop energy sector directory services
- testing and maintaining directory services.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- configuring directory service roles and services
- configuring the directory services infrastructure
- creating and maintaining directory service objects
- maintaining the directory services environment
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant tools and software
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing energy sector directory services
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0017 Develop industrial control programs for microcomputer equipped devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop industrial control programs for microcomputer equipped devices.

It includes preparing and developing devices, circuits and control programs for microcomputer equipped devices. It also includes evaluating and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare microcomputer equipped devices	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3 Scope of development work is determined from design brief and in consultation with relevant person/s
	1.4 Development work is planned in accordance with workplace procedures for timelines in consultation with others involved
	1.5 Development tools and software are selected based on design brief requirements and performance standards
	1.6 Materials and devices/components required for the work are selected on compatibility of control program and in accordance with design brief and project budget
	1.7 Activities are implemented to ensure development work is carried out efficiently
2 Develop devices, circuits and control programs	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Knowledge of computer-equipped devices and systems and compliance standards are applied to the design
	2.3 Alternative arrangements for the development are evaluated in accordance with the design brief
	2.4 Safety, functional and budget considerations are in accordance with design
	2.5 Prototype devices and circuits are constructed and tested in accordance with the design brief and relevant industry standards
	2.6 Programming language code functions and features in current use are applied to developing control programs
	2.7 Prototype malfunctions are identified, rectified and re-tested in accordance with workplace procedures and design brief
	2.8 Program development is documented and submitted to appropriate person/s for approval
	2.9 Unplanned events are identified and resolution techniques are applied in accordance with workplace procedures
	2.10 Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards

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3 Evaluate and complete documentation	**3.1** Testing and workplace procedures are developed to evaluate control program in accordance with workplace procedures
	3.2 Problems and errors in program are identified and rectified in accordance with workplace procedures and design brief
	3.3 Intermediate and final work reports are completed in accordance with workplace procedures and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing control programs for microcomputer equipped devices must include the following:	• at least three interacting functions using a relevant industry programming language

Unit Mapping Information

This unit replaces and is equivalent to UEENEED150A Develop industrial control programs for microcomputer equipped devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0017 Develop industrial control programs for microcomputer equipped devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- completing documentation and presenting program development effectively
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining development work requirements
- developing control program within safety and functional requirements and budget limitations
- identifying the appropriate development tools and software
- obtaining approval for final program
- preparing to develop control programs for microcomputer equipped devices
- selecting devices/components compatibility.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- programming terms, including:
  - complex data types and structures
  - documentation and debugging
  - interfacing high-level languages to assembler
  - interrupt service routines
  - language levels and their features
  - language programming
  - language simulators and emulators
  - modular programming

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- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant tools and software
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing control programs for microcomputer equipped devices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0018 Develop web pages for engineering applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop web pages for engineering applications.

It includes working safely, developing web pages using authoring tools, client-side scripting, fundamental server-side scripting and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop web pages for engineering applications	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of development work is determined from page development specifications and in consultation with relevant person/s
	1.3	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.4	Relevant development tools and software are selected in accordance with development requirements and relevant industry standards
	1.5	Strategies are implemented to ensure development work is in accordance with workplace procedures
2 Develop web pages for engineering applications	**2.1**	Syntax functions and features of mark-up language scripts are applied to developing client-side programming in accordance with development requirements and workplace procedures
	2.2	Pages are created and rendered with relative and absolute links, images and table formatting in accordance with development requirements and workplace procedures
	2.3	Forms are created with relevant elements and element groupings in accordance with development requirements and workplace procedures
	2.4	Server scripting languages are applied to scripting to developing client-side programming and validations in accordance with development requirements and workplace procedures
	2.5	Unplanned events are analysed to provide effective solutions in accordance with workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Test, evaluate, implement and document developed web pages	**3.1**	Tests and workplace procedures are developed to evaluate web page programming in accordance with development requirements
	3.2	Problems and bugs in web page programming are identified and rectified in accordance with development requirements
	3.3	Intermediate and final work reports are completed in

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	accordance with relevant industry standards and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, implementing and testing hpertext mark-up language (HTML) pages must include at least four of the following features:	• relative and absolute links, images and table formatting • cascaded styles sheets • forms • new browser windows • validation of form data.
Developing, implementing and testing of server scripting for database access must include at least four of the following features:	• form data input response • form data processing • database access • output of database table contents • insertion of table data to database.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED129A Develop web pages for engineering applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0018 Develop web pages for engineering applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing and dealing with unplanned events to provide solutions
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- applying server scripting languages to scripting to developing client-side programming and validations
- applying syntax functions and features of mark-up language scripts
- completing intermediate and final work reports
- creating and rendering effective web pages
- creating and rendering pages with relative and absolute links, images and table formatting
- creating forms with relevant elements and element groupings
- developing and testing workplace procedures
- developing web pages for engineering applications
- identifying and rectifying problem and bugs in web page program
- identifying relevant development tools and software
- implementing strategies for development work
- interpreting page development requirements
- monitoring quality of work
- preparing to develop web pages for engineering applications
- providing basic web functionality
- selecting relevant development tools and software
- testing, evaluating, implementing and documenting developed web pages.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- client server architecture

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- configurations and profile overview
- consideration for system architecture
- extensible mark-up language (XML)
- extensible stylesheet language (XSL) generating hypertext mark-up language (HTML) from XML
- HTML scripting
- HTML
- problem-solving techniques
- relevant development tools and software
- relevant forms
- relevant manufacturer specifications and installation instructions
- relevant job safety assessments or risk mitigation processes
- relevant server scripting languages
- relevant syntax functions and features
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, quality, policies and procedures
- wireless thin client programming.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing basic web pages for engineering applications
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0019 Develop, implement and test object-oriented code

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, implement and test object-oriented code.

It includes following development scope, using appropriate development software, writing code and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop object-oriented code	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed

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	1.3	Scope of code development work is determined from job performance specifications and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.5	Relevant development kit and software are selected in accordance with specified requirements and performance standards
	1.6	Strategies are implemented to ensure programming is carried out efficiently
2 Develop object-oriented code	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Correct syntax is applied to developing code
	2.3	Features of object-orientated programming language are applied to develop and test solutions
	2.4	Code written features data encapsulation, inheritance and libraries
	2.5	Approaches to issues/problems are analysed to provide effective solutions
	2.6	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Test and document the development of object-oriented code	**3.1**	Testing procedures are developed to analyse code in accordance with job performance specifications and workplace procedures
	3.2	Problems in code are rectified to ensure job performance specifications are met
	3.3	Intermediate and final documentation is completed in accordance with relevant industry standards and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing object-oriented code must consist of multiple user-classes and include at least the following:	• inheritance • arrays • graphical user interface (GUI) components • exceptions • file input/output (I/O) • event handling

Unit Mapping Information

This unit replaces and is equivalent to UEENEED111A Develop, implement and test object oriented code.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0019 Develop, implement and test object-oriented code

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying correct syntax to developing code
- applying features of object-oriented programming language
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- creating new classes
- determining code development work from job performance specifications and in consultation with relevant person/s
- developing code
- developing and testing workplace procedures
- documenting outcomes in accordance with relevant industry standards
- identifying issues/problems and bugs in code to provide solutions
- implementing strategies to ensure programming is carried out efficiently
- monitoring quality of work
- planning activities to meet scheduled timelines
- preparing to develop object-oriented code
- rectifying problems in code
- selecting development kit and software
- defining and using arrays
- creating graphical user interfaces (GUI) applications using library classes
- using GUI components and event-driven programming.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- file input/output (I/O)

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- multi-threading
- object-oriented programming language elements
- object-oriented programming language operators and control structures
- relevant code written features, including:
  - data encapsulation
  - inheritance
  - system libraries
- relevant collections and collection framework
- relevant development kit and software
- relevant exception handling
- relevant features of object-oriented programming
- relevant programming
- job safety assessments or risk mitigation processes
- relevant syntax to developing code
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, quality policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing object-oriented code
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0020 Evaluate and modify object-oriented code programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and modify object-oriented code programs.

It includes applying safe working practices, following work instructions and workplace procedures, applying object-oriented code scripting, and testing and documenting outcomes.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate and modify programs in object-oriented code	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of program modification work is determined from job performance specification and/or in consultation

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		with relevant person/s
	1.3	Activities are planned in accordance with workplace procedures for timelines and consultation with others involved
	1.4	Relevant development kit and software are selected in accordance with job specifications and relevant industry standards
	1.5	Strategies are implemented to ensure programming is in accordance with workplace procedures
2 Evaluate and modify programs in object-oriented code	**2.1**	Functions are applied to object-oriented programming in accordance with job specifications and workplace procedures
	2.2	Syntax is applied to evaluating and modifying programs in accordance with job specifications and workplace procedures
	2.3	Key features of the object-orientated programming language are applied to evaluation and modification in accordance with job specifications and workplace procedures
	2.4	Unplanned events are analysed to provide effective solutions in accordance with workplace procedures
	2.5	Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards
3 Test and document modified programs	**3.1**	Procedures are developed to test modified programming in accordance with job specifications and workplace procedures
	3.2	Problems and bugs in code are rectified in accordance with job specifications and workplace procedures
	3.3	Intermediate and final work reports are written in accordance with relevant industry standards and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED103A Evaluate and modify object oriented code programs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0020 Evaluate and modify object-oriented code programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying computer functions to object-oriented programming
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements
- applying syntax to evaluating and modifying programs
- dealing with unplanned events
- developing testing procedures
- evaluating and modifying programs in object-oriented code
- identifying problem and bugs in code
- rectifying problem and bugs in code
- selecting relevant development kit and software
- testing and documenting modified programs in object-oriented code
- using key features of object-oriented programming to evaluate and modify program.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- object-oriented programming language elements
- object-oriented programming language operators and control structure
- problem-solving techniques
- relevant development kit and software currently used in industry
- relevant industry standards
- relevant specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, quality, policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to evaluating and modifying programs written in object-oriented code
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0021 Install and administer UNIX/LINUX-based networked computers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and administer UNIX/LINUX-based networked computers.

It includes safe working practices, performing UNIX/LINUX, LINUX or Mac OSX operating system installation, administration functions of logging in and out, setting up graphic user interface (GUI) applications, manipulating text files, creating and searching files and directories, changing permissions, using text editors, identifying and modifying initialisation files, streamlining command, execution using shell features, using network commands and documenting all administration activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install, upgrade and maintain	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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network operations		for a given work area are identified, obtained and applied
	1.2	Scope of the administration work is determined from network specifications and in consultation with relevant person/s
	1.3	Activities are planned in accordance with workplace procedures for timelines and consultation with others involved
	1.4	UNIX/LINUX system variants, versions and updates required to maintain computers and networks are identified and obtained in accordance with workplace procedures and job specifications
2 Install, upgrade and maintain UNIX/LINUX-based computers and network operations	**2.1**	UNIX/LINUX operating system is installed, upgraded and configured on computers and servers in accordance with developer instructions and network requirements
	2.2	Desktop environment, network protocols and services and system security are implemented in accordance with workplace procedures and job specifications
	2.3	Access to resources is configured and limitations specified for users in accordance with workplace procedures and job specifications
	2.4	UNIX/LINUX-based network malfunctions are identified and rectified in accordance with workplace procedures and job specifications using tests of devices and drivers, storage, network protocols, connections and services and system security configuration processes
	2.5	Network performance and reliability is monitored and optimised in accordance with workplace procedures
	2.6	UNIX/LINUX-based network administration is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or relevant services
3 Document network administration activities	**3.1**	Written justification is produced for network upgrading and maintenance and relevant person/s notified in accordance with workplace procedures
	3.2	Network administration and documentation are

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maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and configuring the operating system and administering must include at least the following:	• two networked computers
	• one of the following:
	  • UNIX
	  • LINUX

Unit Mapping Information

This unit replaces and is equivalent to UEENEED113A Install and administer UNIX based networked computers.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0021 Install and administer UNIX/LINUX-based networked computers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- configuring access to resources for users
- dealing with unplanned events
- documenting computer/network administration activities
- documenting network administration activities
- identify the UNIX/LINUX-based operating system variants, versions and updates required
- identifying computer/network malfunctions
- installing, upgrading and maintaining UNIX/LINUX-based computers and network operations
- installing, upgrading and configuring computer operating system
- preparing to install, upgrade and maintain network operations
- rectifying computer/network malfunctions
- carrying out UNIX/LINUX-based network administration efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or relevant services.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- accessing UNIX/LINUX and server and graphic user interface (GUI)
- backup and restoring data
- devices and drivers, storage, network protocols, connections, services and system security configuration processes
- directory and file management
- GUI applications

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- networking/internet set-up procedures
- installing applications software
- operating system components and structure
- operating systems malfunctions and solutions
- printing
- relevant manufacturer specifications and developer instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- system processes and memory management (Korn and C shells)
- system tools
- UNIX/LINUX operating systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing and administering UNIX/LINUX-based computers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0022 Install and configure a client computer operating system and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and configure a client computer operating system and software.

It includes working safely, installing and testing the operating system and application software, testing functionality, rectifying operating anomalies, following work instructions and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and configure a computer operating system and software	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of work is determined from documentation and/or discussions with work supervisor
	1.3	Operating system and application software versions required for the installation are obtained in accordance with workplace procedures and job requirements
2 Upgrade computer and peripheral software	**2.1**	Operating system, application and network software components are installed in accordance with installation instructions and relevant industry standards
	2.2	Operating system, software applications and network device drivers are tested in preparation for return to service/customer in accordance with workplace procedures
	2.3	Operating system network and software malfunctions are identified using logical techniques in accordance with operating system configuration and workplace procedures
	2.4	Malfunctions are rectified using relevant software in accordance with workplace procedures and relevant industry standards
	2.5	Methods for dealing with unplanned situations are in accordance with WHS/OHS and workplace procedures
	2.6	Installation and configuration are carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or relevant services
3 Complete and report upgrading and maintenance activities	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Operating system network and software installation is documented in accordance with workplace procedures and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and configuring operating system, including device drivers and network software, must include at least one of the following:

- software application for a client computing device

Unit Mapping Information

This unit replaces and is equivalent to UEENEED143A Install and configure a client computer operating system and software.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0022 Install and configure a client computer operating system and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- carrying out installation and configuration without waste of materials and energy or damage to apparatus, the surrounding environment or relevant services
- completing and reporting upgrading and maintenance activities
- dealing with unplanned situation
- documenting installation activities
- identifying and rectifying operating systems and application malfunctions
- installing and configuring operating system
- installing and configuring software for an application
- installing operating system, application and network software
- obtaining relevant operating and software versions
- preparing to install and configure a computer operating system and software
- testing operating system, software applications and network device drivers
- upgrading computer and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- file structure and management
- function, components and concepts
- operating system components and structure
- operating systems available
- operating systems malfunctions and solutions
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes

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- relevant manufacturer specifications and operating instructions
- relevant materials, energy, surrounding environment and relevant services
- relevant operating system, application and network software
- relevant software
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- system installation and configuration
- system tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment used in industry
- resources that reflect current industry practices in relation to installing and configuring a computer operating system and software
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0023 Install and configure network systems for internetworking

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and configure network systems for internetworking.

It includes applying safe working practice, installing and configuring routers, and documenting installation and configuration activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and configure internetworking systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed

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	1.3	Internetworking installation and configuration are determined from internetworking performance specifications and in consultation with relevant person/s
	1.4	Media and software required for internetworking is selected in accordance with workplace procedures
	1.5	Network cabling test reports are obtained and reviewed to determine internetworking systems in accordance with relevant industry standards
	1.6	Activities are planned in accordance with workplace procedures for timelines and in consultation with others involved
	1.7	Development tools and software are selected in accordance with relevant industry standards
	1.8	Strategies are implemented to ensure network development is carried out efficiently
2 Install and configure internetworking systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Internetworking arrangements, sub-netting and routing protocols are applied to installing, configuring routers and transmission control protocol (TCP)/internet protocol (IP) addresses
	2.3	Routing protocols are selected and configured as specified for internetworking systems
	2.4	Routing, TCP/IP and access malfunctions are identified and rectified using solutions of basic internetworking arrangements and protocols
	2.5	Approaches to issues/problems are analysed to provide effective solutions
	2.6	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Complete documentation of internetworking systems	**3.1**	Justification for internetworking installation and configuring activities is documented and relevant person/s notified in accordance with workplace procedures
	3.2	Network services records are maintained in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and configuring internetworking systems must include at least the following:	between two: • local area networks (LANs) to form a wide area network (WAN) or • a LAN and the internet

Unit Mapping Information

This unit replaces and is equivalent to UEENEED117A Install and configure network systems for internetworking.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0023 Install and configure network systems for internetworking

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing issues/problems
- applying internetworking arrangements, subnetting and routing protocols
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- engaging with relevant person/s to meet scheduled timelines
- determining internetworking installation and configuration activities
- documenting internetworking installation and configuration activities
- identifying and rectifying routing, transmission control protocol (TCP)/internet protocol (IP) and access malfunctions
- implementing strategies for network development
- installing and configuring routing and TCP/IP
- monitoring quality of work in accordance with workplace procedures and relevant industry standards
- obtaining and reviewing network cabling
- preparing to install and configure internetworking systems
- selecting development tools and software
- selecting internetworking media and software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- router security
- router boot sequence
- router operating system management
- password recovery

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- router components and interfaces
- troubleshooting at all layers
- interior and exterior routing protocols
- distance vector routing protocols
- link-state routing protocols
- routing tables
- metrics used by routing protocols to find routes
- advantages and disadvantages of distance vector and link-state routing protocols
- problem-solving techniques
- relevant development tools and software
- relevant industry standards
- relevant internetworking arrangements, sub-netting and routing protocols
- relevant internetworking performance specifications
- relevant manufacturer specifications and installation instructions
- relevant route summarisation
- relevant router configuration
- relevant routing protocols
- relevant routing, TCP/IP and access malfunctions
- relevant job safety assessments or risk mitigation processes
- relevant TCP/IP
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - network service records
- relevant workplace instructions, quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in installing and configuring networking

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systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0024 Integrate multiple computer operating systems on a client server local area network

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to integrate multiple computer operating systems on a client server local area network (LAN).

It encompasses applying different computer and network operating systems on a single LAN, using network standards and protocols, selecting network topology and physical media, disaster planning recovery, performance management and documentation of work activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install multiple operating systems on computers and a client server network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Operating systems, devices, software and services required are determined from network performance specifications and in consultation with relevant person/s
	1.3	Network security policy is reviewed in accordance with network performance specifications and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures and security policies for timelines and in consultation with others involved
	1.5	Relevant person/s is consulted to ensure the work is coordinated effectively with others in accordance with workplace procedures
2 Install and configure computer and network operating systems	**2.1**	Operating systems and software on computers and client server are installed and configured in accordance with network performance specifications and relevant industry standards
	2.2	Network protocols are installed and configured to integrate computers with different operating systems in accordance with relevant industry standards and network performance specifications
	2.3	Security measures of the network are implemented in accordance with workplace procedures, relevant industry standards and network performance specifications
	2.4	Disaster recovery plan is tested in accordance with workplace procedures and security measures
	2.5	Methods for dealing with unplanned situations are selected in accordance with and workplace procedures
3 Monitor and optimise computer and network performance	**3.1**	Network is monitored and methods are implemented to optimise system performance in accordance with workplace procedures and network performance specifications
	3.2	Computer and server malfunctions are identified and rectified using techniques and solutions in accordance with workplace procedures and network performance specifications
	3.3	Computer and server operating system incremental updates and security patches are installed in accordance

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		with workplace procedures and network performance specifications
	3.4	Methods for dealing with unplanned situations are selected in accordance with workplace procedures and security policies
	3.5	Quality checks of work outcomes are conducted in accordance with workplace procedures, network performance specifications and relevant industry standards
	3.6	Work is carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
4 Report integration and outcome of network monitoring activities	**4.1**	Documented justification is made for solutions used to rectify malfunctions and relevant person/s notified in accordance with workplace procedures
	4.2	Computer and network installation and monitoring records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Integrating multiple computer operating systems on a client server network must include at least two of the following:	• different operating systems for a client server, and • computers connected to the server to form a client server network.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED124A Integrate multiple computer operating systems on a client server local area network.

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Links

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Assessment Requirements for UEECS0024 Integrate multiple computer operating systems on a client server local area network

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- carrying out work efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
- dealing with unplanned events
- determining the correct operating system, devices, software and services required
- following quality monitoring
- identifying and rectifying common malfunctions using solutions
- implementing system security measures
- installing and configuring client server network operating system and software
- installing network protocols and configuring to integrate computers with different operating systems
- maintaining computer and network monitoring and security records
- monitoring and optimising computer and network performance
- preparing to install multiple operating systems on computers and a client server network
- providing justification for solutions used to rectify malfunctions
- reporting integration and outcome of network monitoring activities
- testing effectiveness of disaster recovery plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- network operating systems
- networking fundamentals
- problem-solving techniques
- relevant industry standards

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- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace instructions, quality, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to integrating multiple computer operating systems on a client server network
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0025 Modify/redesign industrial computer systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to modify/redesign industrial computer systems.

It includes applying safe working practices, identifying system parameters, modifying systems, following procedures and documenting final modifications for approval.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to modify/redesign computer systems	**1.1** WHS/ OHS processes and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.5 System operating parameters are identified by reviewing system specifications and component technical data
	1.6 Limitations and operation of the system to be modified are determined from specifications and manufacturers' data
	1.7 Modification is determined from measurements, tests, inspections, system limitations and relevant industry requirements
	1.8 Specifications and work instructions for the modifications are documented in accordance with workplace procedures
	1.9 Tools, equipment, applications and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures
2 Generate modification/redesign of computer systems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Alternative modification arrangements are discussed

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		with relevant person/s
	2.3	Safety, functionality and economic considerations are incorporated in the proposed modification design
	2.4	Proposed modification for alteration of the system/s and specifications is documented in accordance with relevant industry standards
	2.5	Changed outcomes in the use and operation of the system/s of the proposed modification are documented
	2.6	Unplanned situations are dealt with in consultation with relevant person/s and job specifications in accordance with relevant industry standards
	2.7	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.8	Modification/redesign is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles
3 Complete and report modification/redesign activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Proposed modification is checked in accordance with workplace procedures and relevant industry standards
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Proposed modification is submitted for workplace and relevant industry standard approval
	3.5	Approved modification/redesign documents are completed and stored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Modifying/redesigning computer systems must include at least two of the following:

- computer systems
- associated components
- applications
- controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEED145A Modify-redesign of industrial computer systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0025 Modify/redesign industrial computer systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- checking work to ensure no damage and/or waste to apparatus, environment, materials and services
- consulting with relevant person/s to ensure work is coordinated effectively
- dealing with unplanned events in consultation with relevant person/s and job specifications
- determining limitations and operation of the system to be modified
- developing outlines of alternative designs
- developing the modified/redesigned system within safety and functional requirements and budget considerations
- discussing alternative modification arrangements
- documenting and presenting modifications/redesigns
- documenting specifications and work instructions for the modifications
- generating modification/redesign of computer system/s
- identifying system operating parameters by reviewing system specifications and component technical data
- obtaining approval for final modified/redesigned system
- obtaining tools, equipment, applications and testing devices and checking for correct operation and safety
- preparing to modify/redesign of computer system/s
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- design objectives (specifications)
- functional and non-functional requirements of customer/s
- implementation of the selected design
- optimisation of the proposed solution
- problem-solving techniques
- relevant analysis
- relevant computer system and modifications
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and installation instructions
- relevant materials, apparatus, environment and services
- relevant modification/redesign specifications?
- relevant system limitations and operation
- relevant system operating parameters
- relevant tools, equipment, applications and testing/measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles
- validations of the resulting design.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to modifying/redesigning computer systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0026 Plan industrial computer systems projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan industrial computer systems projects.

The unit includes establishing budgets; conducting critical path analysis; developing workflow strategies; and documenting, presenting and negotiating budgets.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to plan project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Project planning techniques are reviewed and implemented in accordance with workplace procedures

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	1.3	Scope of the project is determined from design brief, specifications and/or relevant documentation and discussions with relevant person/s
2 Develop project plan proposal	**2.1**	Estimated plant, material, labour and relevant costs are sought and obtained from relevant person/s in accordance with workplace procedures
	2.2	Project budget is determined from estimated plant, material, labour and relevant costs in accordance with workplace procedures
	2.3	Critical path analysis is applied to developing workflow strategies
	2.4	Sources and availability of materials and human resources required for the project are determined in accordance with workplace procedures
	2.5	Risk management strategies are sought and obtained for incorporating into the project plan
	2.6	Project plan is reviewed and adjusted to rectify any anomalies in accordance with design brief, specifications and workplace procedures
	2.7	Project plan proposal is documented in accordance with workplace procedures
3 Obtain approval for project plan	**3.1**	Project plan is presented and discussed with relevant person/s of authority
	3.2	Alterations to the project plan resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final project plan is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning of a computer system project must include at least all of the following features:

- redundancy
- scalability
- 100 users
- catering multiple operating systems.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED148A Plan industrial computer systems projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0026 Plan industrial computer systems projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- determining a project budget
- determining sources and availability of materials and human resources required for the project
- determining the scope of the project
- developing workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan
- obtaining approval of the final plan
- obtaining plant, material, labour and relevant costs
- obtaining risk management strategies for incorporation
- preparing to plan project
- reviewing and adjusting project plan to rectify anomalies
- reviewing and implementing project planning techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- critical path analysis techniques
- factors influencing sequence and restraints of project activities
- purpose of project planning
- relevant manufacturer specifications
- relevant materials and human resources
- relevant plant, material, labour and relevant costs
- relevant project planning techniques

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, instructions, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to planning computer systems projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0027 Provide programming solution for computer systems engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide programming solutions for computer systems engineering problems.

It includes identifying and developing programming solutions and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to identify computer systems engineering problem	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Scope of engineering programming problem is determined from performance specifications and/or documentation and in consultation with relevant person/s
	1.4	Activities are planned in accordance with workplace procedures for timelines in consultation with others involved
	1.5	Software development tools are selected based on programming requirements and performance specification
	1.6	Activities are implemented to ensure programming is carried out in accordance with workplace procedures
2 Develop programming solutions	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Demonstrated structured programming functions and features are applied to provide a programming solution
	2.3	Code in programs are analysed and modifications and/or corrections are made to rectify engineering programming problem
	2.4	Key features of the programming language are applied to develop and test solutions
	2.5	Unplanned issues/problems are analysed and effective solutions identified in accordance with workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and/or relevant industry standards
3 Test and document the programming solutions	**3.1**	Test methods are developed to analyse code in accordance with relevant programming language and workplace procedures
	3.2	Problems and errors in program are rectified in accordance with program performance requirements and relevant industry standards
	3.3	Intermediate and final documentation are completed and relevant person/s notified in accordance with relevant industry standards and workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED151A Provide programming solution for computer systems engineering problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0027 Provide programming solution for computer systems engineering problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- determining the engineering programming problem
- developing testing procedures
- identifying problems and errors in code
- preparing to identify computer systems engineering problems and developing programming solutions
- rectifying problems and errors in code
- using key features of programming language.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- problem-solving techniques
- relevant manufacturer specifications
- relevant programming fundamentals and high-level language programming, including:
  - complex data types and structures
  - control applications of software
  - interfacing high-level languages to assembler
  - interrupt service routines
  - program development
  - programming concepts, including:
    - programming languages currently used by industry
    - software terminology
- relevant job safety assessments or risk mitigation processes
- relevant tools and software

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to providing programming solution for engineering problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0028 Select, install, configure and test multimedia components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select, install, configure and test multimedia components.

It includes working safely; selecting, installing, configuring and testing multimedia computer system components, applications and driver software; following work instructions and completing reports.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Select and prepare to install multimedia components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2 Advice is sought from the work supervisor to ensure work is coordinated with others in accordance with workplace procedures
	1.3 Multimedia components, drivers and application software are obtained and checked in accordance with workplace procedures and job requirements
	1.4 Multimedia devices, drivers and application software are prepared for installing in accordance with job requirements and manufacturer specifications
2 Install multimedia components	**2.1** Multimedia components are assembled and connected in accordance with manufacturer instructions
	2.2 Multimedia devices, drivers and application software are selected in accordance with job requirements and manufacturer specifications
	2.3 Multimedia devices are installed and checked where hot pluggable computer is switched on and start-up conducted in accordance with workplace procedures
	2.4 Multimedia devices, operating system, application programs and multimedia devices are checked in accordance with workplace procedures and manufacturer specifications
	2.5 Multimedia devices and drivers are tested in accordance with workplace procedures, relevant industry standards and manufacturer specifications
	2.6 Hardware and/or software faults are identified in accordance with workplace procedures and manufacturer specifications
	2.7 Faults are rectified in accordance with WHS/OHS requirements and manufacturer specifications
	2.8 Unplanned events are referred to supervisor for direction in accordance with workplace procedures
	2.9 Computer is shut down in accordance with workplace procedures
	2.10 Work is carried out without waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles

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3 Complete work and report	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Work report is completed and supervisor notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEED130A Select, install, configure and test multimedia components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0028 Select, install, configure and test multimedia components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including the use of risk control measures
- assembling multimedia computer devices
- carrying out work without waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
- completing work and reporting
- connecting computer, components and peripherals in accordance with requirements
- dealing with unplanned events
- documenting and reporting multimedia computer device activities and results
- identifying faults in hardware and/or software
- installing multimedia components
- installing multimedia devices
- obtaining and checking multimedia devices, drivers and application software
- preparing multimedia devices, drivers and application software
- rectifying faults
- selecting and preparing to install multimedia components
- setting up multimedia computer devices
- testing multimedia computer devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- colour printers
- colour scanners
- multimedia storage devices
- multimedia sub-systems
- problem-solving techniques

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- relevant job safety assessments or risk mitigation processes
- relevant compact disc read-only memory (CD-ROM), CD-ROM/digital versatile disc (DVD) standards
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant multimedia devices, drivers and application software
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sound cards and sound card standards
- sustainable energy principles
- video cards, types and specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to selecting, installing, configuring and testing multimedia devices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0029 Set up and configure basic local area network (LAN)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and configure local area network (LAN).

It includes planning, setting up, configuring, maintaining, completing work and documenting activities for LAN of up to 20 connected devices.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0003 Assemble, set up and test computing devices

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up and configure LAN	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Extent of set-up and configuration work is determined from job specifications and consultations with relevant

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		person/s
	1.3	Relevant person/s is consulted to coordinate work effectively with others on work site
	1.4	Hardware and software needed for work are obtained in accordance with workplace procedures and checked against job requirements
	1.5	Work is checked to ensure damage has not occurred and complies with requirements
2 Set up, configure and maintain LAN	**2.1**	Hazards are identified, risks are assessed and control measures are implemented
	2.2	Layout of network hardware cabling and outlets is determined from job specifications and/or consultations with relevant person/s
	2.3	Hardware is installed in accordance with workplace procedures
	2.4	Network software and protocols are installed and configured in accordance with network requirements
	2.5	Network operations are tested and anomalies identified and corrected
	2.6	Reported network failures and faults are responded to using appropriate tools and methods
	2.7	Identified causes of reported problems are rectified and network is tested in accordance with workplace procedures
	2.8	Unplanned situations are responded to in accordance with workplace procedures and approval of authorised person/s
	2.9	Set-up, configuration and maintenance are completed without waste of materials, damage apparatus, surrounding environments or services using sustainable energy practices in accordance with workplace procedures
3 Complete work and document activities	**3.1**	WHS/OHS risk control work completion measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures

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3.3 Network configuration and maintenance records are maintained in accordance with workplace procedures

3.4 Service report is completed and forwarded to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and configuring LAN must include at least two the following:	• two personal computers/workstations • one server • switch or router • one input or output device

Unit Mapping Information

This unit replaces and is equivalent to UEENEED146A Set up and configure basic local area network (LAN).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0029 Set up and configure basic local area network (LAN)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- cleaning worksite and making safe
- completing work and documenting activities
- coordinating work with others
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying and correcting anomalies
- identifying the extent of work
- installing and configuring software and installing hardware
- obtaining specified hardware and software and checking against job requirements
- planning and configuring local area network (LAN)
- rectifying network problems and maintaining maintenance records
- setting up, configuring and maintaining LAN.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- analogue and digital signals, including:
  - how information is carried
  - signal distortion, including attenuation, reflection, noise, dispersion, jitter, latency and collisions
- the open systems interconnection (OSI) model for computer system interconnect, including:
  - physical layer
  - data link layer

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    - network layer
    - transport layer
    - session layer
    - presentation layer
    - application layer
    - purpose of each layer of OSI model
    - comparing transmission control protocol (TCP) and internet protocol (IP)
    - TCP and user datagram protocol (UDP)
    - TCP segment format
    - UDP segment format
    - TCP connection methods
- types of networks, network components and hardware
- LAN architectures, including:
    - general principle of LAN, including:
        - benefits of a LAN
        - the elements of a LAN
        - the different types of network topology and their applications
    - cabling and termination arrangements for a LAN system
- multiple access units and their function, including switches, access points and routers
- LAN standards, including ethernet (IEEE 802.3) and wireless ethernet (IEEE 802.11)
- basic principle of medium access methods such as polling and CSMA/CD
- current network operating systems available for establishing a LAN, including:
    - network protocols
    - concepts of TCP/IP addressing
    - peer-to-peer and server based
    - establishing workgroups
    - file and device sharing
- network hardware installation methods, including installing network cards, and installing switches and routers
- concepts and the hardware required for internet and world wide web working LANs
- network security
- network device set-up and configuration
- hardware requirements
- network testing and diagnostic tools and methods
- networking protocols
- network security
- network signal propagation
- basics of encoding networking signals
- IP addressing and sub-netting
- cabling layouts
- network protocols and faults

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- network software and hardware installation and configuration methods
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation including maintenance records and service records
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0030 Set up, configure and test biometric devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up, configure and test biometric devices.

It includes working safely, following written and oral instructions, applying knowledge of biometric devices, installing and testing performance, and documenting outcomes.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up and test biometrics devices	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of device, set-up and configuration work is determined from job specifications and in consultation

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		with relevant person/s
	1.3	Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.4	Hardware, software and materials required for work are obtained in accordance with workplace procedures and job specifications
	1.5	Tools and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Set up and test biometric devices	**2.1**	Circuits/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2	Layout of biometric system network hardware, cabling and outlets is determined from job specifications and/or in consultation with relevant person/s
	2.3	Hardware is set up in accordance with network requirements, workplace procedures and job specifications
	2.4	Biometric devices are set up and configured in accordance with network requirements, workplace procedures and job specifications
	2.5	Biometric devices on a network are tested and anomalies identified and corrected
	2.6	Biometric device failures are responded to and rectified in accordance with network requirements, workplace procedures and job specifications
	2.7	Biometric device work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.8	Identified causes of reported problems are rectified and biometric devices are tested in accordance with workplace procedures
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
3 Complete set-up and testing and report	**3.1**	Work area is cleaned and made safe in accordance with

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outcomes		workplace procedures
	3.2	Biometric device installation and maintenance records are maintained in accordance with workplace procedures
	3.3	Service report is completed and forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and testing must include at least the following:

- four different types of biometric devices

Unit Mapping Information

This unit replaces and is equivalent to UEENEED153A Set up, configure and test biometric devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0030 Set up, configure and test biometric devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- carrying out biometric device work efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
- checking and isolating circuits/equipment
- completing set-up, testing and reporting
- dealing with unplanned situations
- determining layout of biometric system network hardware, cabling and outlets
- identifying and rectifying problems
- obtaining hardware, software and materials required for work
- placing equipment in accordance with regulatory and customer requirements
- preparing to set up and test biometrics devices
- responding to system anomalies to effect functionality of devices
- selecting appropriate equipment
- setting up and testing biometric devices
- testing and verifying functional operation of devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- biometric device tools, software and testing techniques
- biometrics techniques and processes, including definitions, terminology, advantages, disadvantages and applications
- legal aspects of biometrics
- physical interaction with biometric devices, including operation and installation of biometric devices (e.g. iris scanners, hand scanners, voice recognition apparatus, facial recognition

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devices and relevant equipment)
- problem-solving techniques
- relevant hardware, software and materials
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up and testing biometric devices
- applicable documentation including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0031 Set up, create and implement content for a web server

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up, create and implement content for a web server.

It includes working safely, installing and administering server software and databases, server scripting, configuring access and security, and documenting work activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop and implement web-based server	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Development work is determined from server performance specifications and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with others involved in work
	1.5	Development tools, testing devices and software are selected on specified requirements in accordance with relevant industry standards and workplace procedures
	1.6	Strategies are implemented to ensure development work is carried out in accordance with workplace procedures
2 Develop web services	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Server software is installed and configured to functionality and security in accordance with workplace procedures and specifications
	2.3	Syntax functions and features of mark-up language scripts are applied to developing client-side programming in accordance with workplace procedures and specifications
	2.4	Pages are created, rendered with relative and absolute links, images and table formatting using cascaded styles sheets in accordance with workplace procedures and specifications
	2.5	Forms are created with a variety of relevant elements and element groupings in accordance with workplace procedures and specifications
	2.6	Server scripting languages are applied to developing client-side programming and validated in accordance with workplace procedures and specifications
	2.7	Written scripts are interpreted for web functionality and management of relation databases in accordance with workplace procedures and specifications
	2.8	Written scripts are interpreted for web functionality and management of browser windows, security, web application deployment and administration consoles in accordance with workplace procedures and specifications

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	2.9	Solutions are integrated in accordance with server performance specifications
	2.10	Approaches to issues/problems are analysed to provide effective solutions in accordance with workplace procedures
	2.11	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Test, evaluate, implement and complete documentation	**3.1**	Testing and workplace procedures are developed to evaluate client-side programming and web applications and services
	3.2	Problems in client-side programming and web service functionality are identified and rectified in accordance with workplace procedures and server performance
	3.3	Intermediate and final work reports are written in accordance with relevant industry standards and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, implementing and testing hypertext mark-up language (HTML) pages must include at least four of the following:	• relative and absolute links, images and table formatting • cascaded styles sheets • forms • new browser windows • validation of form data
Developing, implementing and testing of server scripting for database access must include at least four of the following:	• form data input response • form data processing • database access • output of database table contents • insertion of table data to database

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- installation and administration of key features of web and web application servers

Unit Mapping Information

This unit replaces and is equivalent to UEENEED110A Set up, create and implement content for a web server.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0031 Set up, create and implement content for a web server

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing approaches to issues/problems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- applying syntax functions and features of mark-up language scripts
- consulting and planning with others to meet scheduled timelines
- creating and rendering web pages
- determining development server performance specifications
- developing and testing workplace procedures to evaluate client-side programming
- developing web services
- identifying problem/s in client-side programming and web services functionality
- implementing strategies to ensure work is carried out
- installing and configure web server software
- monitoring quality of work
- providing web functionality and management of browser windows, security, web application deployment and administration consoles
- providing web functionality and management of relation databases
- rectifying problem/s
- selecting development tools and testing devices and software
- writing intermediate and final work reports.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant comparison of application servers and platforms

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- relevant development tools, testing devices and software
- relevant hypertext transfer protocol (HTTP) servers
- relevant industry standards
- relevant manufacturer specifications and installation instructions
- relevant parameters of different programming languages
- relevant job safety assessments or risk mitigation processes
- relevant server scripting technologies and language
- relevant server software
- relevant testing and validation
- relevant web application technologies
- relevant web services overview
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up and creating content in a web server
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0032 Support computer hardware and software for engineering applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to support computer hardware and software for engineering applications.

It includes applying safe working practices, installing and testing the upgrading components, locating faults in hardware components, replacing faulty sub-systems, installing and testing the operating system and application software, testing functionality, rectifying malfunctions, following work instructions and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to upgrade and maintain computer hardware and software	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of computer and/or peripheral hardware/software upgrade or maintenance is determined in consultation with relevant person/s
	1.3	Relevant person/s is consulted to ensure work is coordinated effectively with others in accordance with workplace procedures
	1.4	Hardware sub-systems required to upgrade and/or maintain computers and peripherals are obtained in accordance with workplace procedures and job requirements
	1.5	Software versions are installed in accordance with workplace procedures and job requirements
2 Upgrade computer hardware and software	**2.1**	Computers are checked and isolated in accordance with WHS/OHS and workplace procedures
	2.2	Computers and/or peripherals are dismantled, as required, for upgrading and parts stored to prevent loss or damage in accordance with manufacturer instructions and/or relevant industry standards
	2.3	Upgrading components are fitted and computer/peripheral apparatus is reassembled in accordance with manufacturer instructions and/or relevant industry standards
	2.4	Upgrading software components are installed in accordance with manufacturer instructions and/or relevant industry standards
	2.5	Operating system, device drivers and application software are tested for return to service/customer in accordance with workplace procedures
	2.6	Computer/peripheral apparatus is tested and prepared for return to customer
3 Maintain operation of computer hardware and software	**3.1**	Need to test and measure live work is determined in accordance with WHS/OHS and workplace procedures
	3.2	Computers are checked and isolated in accordance with WHS/OHS and workplace procedures
	3.3	Computers and/or peripherals are dismantled, as required, to find and rectify faults and parts stored to

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		prevent loss or damage in accordance with manufacturer instructions and relevant industry standards
	3.4	Faults are identified using tests and measured values of operating parameters of computer/peripheral hardware components in accordance with workplace procedures
	3.5	Faulty components are re-checked and fault status confirmed
	3.6	Operating system malfunctions are identified using tests of operating system configuration requirements in accordance with workplace procedures
	3.7	Device driver malfunctions are identified using test of device driver software configuration requirements in accordance with workplace procedures
	3.8	Application software malfunctions are identified and tests of software configuration requirements conducted in accordance with workplace procedures
	3.9	Malfunctions are rectified using latest software versions, incremental updates and bug and security patches in accordance with workplace procedures
	3.10	Computer hardware/peripheral device, operating system device drivers and application software are tested for return to service/customer in accordance with workplace procedures
	3.11	Redundant files are removed and disposed or archived in accordance with workplace procedures
	3.12	Methods for dealing with unplanned situations are selected in accordance with WHS/OHS and workplace procedures
	3.13	Maintenance is carried out efficiently without waste of materials and energy or damage to apparatus, the surrounding environment or relevant services
4 Complete and report upgrade and maintenance activities	**4.1**	Work area is cleaned and made safe in accordance with workplace procedures
	4.2	Written justification is produced for hardware software upgrade and maintenance

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4.3 Upgrade and maintenance are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining and upgrading the operating system and device drivers must include at least the following:	• two engineering application software types for a client device (e.g. computer, mobile device, embedded system) and server
Maintaining a computer and peripheral devices must include at least the following:	• one computer • two external peripheral devices

Unit Mapping Information

This unit replaces and is equivalent to UEENEED112A Support computer hardware and software for engineering applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0032 Support computer hardware and software for engineering applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements
- completing and reporting upgrading and maintenance activities
- configuring authorisation and authentication
- configuring backup and recovery options
- configuring data access and usage
- configuring networking
- dealing with redundant files
- dealing with unplanned events
- dismantling, fitting upgrading sub-systems and reassembling correctly
- documenting maintenance activities
- documenting upgrading activities
- identifying application malfunctions
- identifying deployment or upgrade needs
- identifying device driver malfunctions
- identifying operating system malfunctions
- installing and configuring operating systems and applications software
- maintaining operation of computer hardware and software
- monitoring and maintaining an operating system using system tools
- obtaining appropriate upgrading sub-systems
- preparing to upgrade and maintain computer hardware and software
- rectifying software malfunctions
- testing and identifying faulty components
- testing maintenance repair
- testing upgraded software.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- authentication and authorisation
- configuring file and folder access
- configuring hardware, device drivers and applications
- configuring network connectivity
- file structure and management
- management of peripheral devices
- operating principles of computer peripheral hardware
- operating system components and structure
- operating system imaging and deployment
- operating system installation, upgrades and migration
- operating system malfunctions and solutions
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- remote access
- troubleshooting techniques
- types and applications of computer peripherals
- WHS/OHS requirements
- computing device assembly/disassembly and computer operating systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment used in industry

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- resources that reflect current industry practices required to support computer hardware and software
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEECS0033 Use engineering applications software on personal computers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use computer application software relevant to engineering support work functions.

It includes using computer engineering application software, menus and tools, entering and retrieving information, transferring and printing files and shutting down computer applications.

This unit applies to personnel using computer application software relevant to a workplace. Typically, this will apply to individuals working under supervision.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Computer Systems

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to use computer application software	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for an engineering work area are identified, obtained and

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		applied
	1.2	WHS/OHS risk control measures and procedures in relation to computer and keyboard use are followed in accordance with workplace procedures
	1.3	Application software and information/instructions required for use are obtained
	1.4	On-screen instructions in relation to any anomaly are followed in accordance with workplace procedures
	1.5	Help menu is used to resolve any common start-up, access issues or anomalies
2 Use engineering software application	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Techniques specific to software packages are used to produce relevant files and engineering information
	2.3	Checks are made to ensure accuracy of information produced
3 Output information from software application	**3.1**	Completed files are stored appropriately in accordance with workplace policies and procedures
	3.2	Files are printed and stored electronically as formal records and/or forwarded to relevant personnel
4 Shut down computer	**4.1**	Files are named, arranged, saved and backed up in accordance with workplace policies and procedures
	4.2	Computer shutdown procedures are followed in accordance with workplace procedures and computer powered off

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit demonstration must include at least two of the following types of engineering applications:	• office applications • computer-aided design (CAD) • engineering data analysis software • engineering modelling • project management • network simulator • protocol analyser

Unit Mapping Information

This unit replaces and is equivalent to UEENEED104A Use engineering applications software on personal computers.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEECS0033 Use engineering applications software on personal computers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- using online 'Help' function to resolve common problems
- following application instructions to input and output information
- outputting information to relevant devices
- preparing to use computer applications
- reading and applying software instructions
- saving, storing information and backing up files
- saving, storing, outputting and forwarding information electronically
- shutting down computer
- transferring information between software applications
- using engineering application software.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- software operating system
- relevant engineering computer software applications, including:
  - computer-aided design (CAD)
  - engineering data analysis software
  - engineering modelling
  - project management
  - network simulator
  - protocol analyser
- relevant job safety assessments or risk mitigation processes, including risk control measures

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- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0001 Assemble and connect telecommunication frames and cabinets

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble and connect telecommunication frames and cabinets.

It includes identifying, assembling, connecting and checking quality of assembled telecommunication frames and cabinets.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify telecommunication frame	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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and cabinet		are identified and applied
	1.2	Hazards are identified, risks are assessed and control measures are implemented
	1.3	Work instructions and relevant diagrams are identified and applied
	1.4	Advice is sought from workplace supervisor to ensure work is coordinated with relevant person/s
	1.5	Materials required for work are obtained in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Assemble and connect telecommunication frame and cabinet	**2.1**	WHS/OHS risk control workplace measures are followed
	2.2	Equipment is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Frame/cabinet and communication components are fitted in accordance with work instructions, industry standards, manufacturer instructions and workplace procedures
	2.4	Interconnections are made in accordance with workplace procedures
	2.5	Installation and equipment are checked for compliance with relevant industry standards
	2.6	Completed communication frames/cabinets are checked/tested against manufacturer instructions, industry standards and workplace procedures
	2.7	Unplanned situations are responded to in accordance with workplace procedures and approval of authorised person/s
	2.8	Work is performed using sustainable energy principles and practices without wasting materials, damaging apparatus, surrounding environments or services in accordance with workplace procedures
3 Check quality of	**3.1**	WHS/OHS risk control measures for work completion

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assembled telecommunication frame and cabinet	are followed
	3.2 Quality of assembled frame/cabinet is checked/tested against work instructions, industry standards, manufacturer instructions and workplace procedures
	3.3 Appropriate solutions are used where corrective actions to assembled components are required in accordance with workplace procedures
	3.4 Work report forms are completed and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF115A Assemble and connect telecommunication frames and cabinets.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0001 Assemble and connect telecommunication frames and cabinets

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- checking and testing quality of assembled telecommunication frame and cabinet, including adhering to quality procedures
- completing work report forms
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining and using appropriate solutions in accordance with workplace procedures
- following assembly instructions
- identifying, assembling and connecting telecommunication frame and cabinet
- isolating in accordance with relevant industry standards
- making connection without damaging apparatus
- obtaining relevant equipment, tools, testing devices and materials
- seeking advice from supervisor
- using manufacturer instructions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- cabinet internal cable routing and management provisions
- cabinet ventilation requirements
- cabinet structure, including:
  - internal framework
  - cable entry
  - removable panels
  - multiple cabinets

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    - doors, locks and hinges
    - mounting rails
    - access to equipment and cabling
    - earthing arrangements and methods
- mounting requirements for components, including:
    - rack units
    - patch panels
    - routers
    - servers
- communication cable and conductor terminations, including:
    - approved termination devices and sockets
    - special termination tools and their use
    - cable colour coding up to 100 pair indoor and outdoor cable
- methods of terminating cables, including:
    - cables less than twenty pair
    - twenty pair cable and greater
    - structured cables
    - coaxial cables
    - optical fibre cables
    - termination safety practices
- cable labelling devices, including quality checks and tests
- component installation and interconnections
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications and instructions
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation and diagrams
- relevant workplace policies and procedures
- sustainable energy principles and practices
- telecommunication cabinet assembly, cabling and terminations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0002 Install aerial telecommunication cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install aerial telecommunication cables.

It includes working safely, installing catenary cable, fixing communication cables and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install aerial communication cables	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risks are identified, and risk control measures and workplace procedures are followed in preparation for the work
	1.3 Safety hazards not previously identified are noted and risk control measures implemented
	1.4 Cabling installation is prepared in consultation with others affected by the work and sequenced in accordance with workplace procedures
	1.5 Scope of work is determined from documentation and/or discussions with relevant person/s to establish the work to be undertaken
	1.6 Cable routes are planned in accordance with the precinct, structure, significants and relevant industry standards
	1.7 Advice is sought from relevant person/s to ensure the work is coordinated effectively with others
	1.8 Material required for installation work is obtained in accordance with workplace procedures and job specifications
	1.9 Tools, equipment and testing devices required for the installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked to ensure no damage has occurred in accordance with relevant industry standards
2 Install aerial communication cables	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Poles are checked for soundness in accordance with workplace procedures
	2.3	Catenary cables are installed ensuring sufficient clearances are in accordance with relevant industry standards
	2.4	Cables are attached to catenary without strain or damage in accordance with relevant industry standards
	2.5	Cable ends are protected from damage in preparation for termination
	2.6	Methods for dealing with unplanned situations are discussed with relevant person/s for approval and documented in accordance with workplace procedures
	2.7	Unexpected situations are dealt with safely and with the approval of relevant person/s
	2.8	Quality checks of the installed aerial communication cables are conducted in accordance with workplace procedures
	2.9	Cable installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Document and verify cabling installation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Documenting cable installation is carried out in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF112A Install aerial telecommunication cables.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0002 Install aerial telecommunication cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- reading and interpreting drawings related to cable schedules and routes
- installing catenary cables correctly
- attaching communications cable to catenary without damage
- protecting cable ends
- completing the necessary documentation accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out cable installation efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
- checking poles for soundness
- documenting and verifying cabling installation
- installing aerial communication cables
- obtaining material required for installation
- obtaining tools, equipment and testing devices and checking for correct operation and safety
- planning cable routes in accordance with precinct, structure, significants and relevant industry standards
- preparing to install aerial communication cables
- quality checking the installed aerial communication cables.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- telecommunication aerial cabling requirements and techniques, safe working practices and relevant standards, codes and regulations, including:
  - hazards and control measures in aerial cabling working environment encompassing:
    - risk management and assessment of risk:
      - principle and purpose of risk management

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        - processes for conducting a risk assessment
    - hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents encompassing:
        - parts of an electronic systems and equipment that operate at LV and ELV
        - parts of an electronic systems and equipment where high currents are likely
    - risks and control measures associated with high voltage (HV) encompassing:
        - parts of an electronic systems and equipment that operate at HV
        - the terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of HV
        - control measures used for dealing with the hazards of HV
    - risks and control measures associated with LV encompassing:
        - risks associated with installation, fault finding, maintenance and repair
        - control measures before, while and after working on electronic systems or equipment
        - isolation and tagging-off procedures
        - risks and restrictions in working live
        - control measures for working live
    - risks and control measures associated with working on aerial cables encompassing:
        - soundness of pole for aerial cabling
        - use of aerial safety equipment
        - procedure to apply pole top rescue
    - aerial construction methods and regulations
    - joining aerial cables
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant tools, equipment and testing devices
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- sustainable energy practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing aerial communication cables
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0003 Install and connect cabling for direct access to telecommunications service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and connect cabling for direct access to telecommunications service.

It includes working safely, preparing cabling routes, laying and connecting cabling for direct access to telecommunication services, terminating cabling, inspecting and testing, and completing cabling documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEEDV0013 Solve problems in voice and data communications circuits

or

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to lay and connect cabling for direct access to telecommunication services	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risks are identified and risk control measures and workplace procedures are followed in preparation for the work
	1.3 Remote power feeding is identified and risk control measures prepared
	1.4 Scope of work is determined from documentation and/or discussions with relevant person/s
	1.5 Cable routes are planned within the constraints of the building structure, significants and regulations
	1.6 Earthing requirements are determined with existing earthing arrangements and cable system earth upper and lower resistance limitations
	1.7 Advice is sought from relevant person/s to ensure work is coordinated effectively with others
	1.8 Sources of materials required for work are checked in accordance with routines and workplace procedures
	1.9 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Lay and connect cabling for direct access to telecommunication services	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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2.2 Installed support structure is checked to ensure cable is protected against damage during installation and general operation

2.3 Sufficient excess is allowed at cable ends to facilitate termination

2.4 Telecommunication outlet ends of cable are uniquely labelled to match identifier at originating location in accordance with relevant industry standards

2.5 Cable is placed and secured to maintain safety and interference segregation in accordance with relevant industry standards

2.6 Cable ties are tightened without damage to cable sheath or transmission impairment and trimmed flush in accordance with workplace procedures

2.7 Cables are installed as catenaries or supported by catenaries in internal and external environment to meet above ground clearances and clearances from hazardous electrical services in accordance with relevant industry standards

2.8 Cables are installed underground to meet depth of cover and segregation from hazardous electrical and relevant services in accordance with relevant industry standards

2.9 Over-voltage protection devices are fitted to all cable pairs, as required, to suppress voltage surges with devices protectively earthed in accordance with relevant industry standards

2.10 Telecommunications reference conductor (TRC)/communications earth system (CES)/earth wire insulation is protected and segregated against damage in accordance with relevant industry standards

2.11 Workplace procedures for referring unplanned events to immediate supervisor for directions are followed

2.12 Cabling is installed without waste of materials, energy, services, damage to apparatus and the surrounding environment

2.13 Quality checks are carried out to ensure cabling is in accordance with relevant industry standards

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3	**Terminate, inspect and test cables and earth wires**	**3.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		3.2 Cable sheath is removed to allow for correct termination length without damage to underlying conductors and relevant insulation
		3.3 Network termination device is installed and cable pairs sequentially fanned for termination in accordance with manufacturer specifications
		3.4 Conductors are terminated with colour code sequence using relevant termination tools in accordance with manufacturer specifications
		3.5 Cable shield is earthed in accordance with manufacturer specifications and relevant industry standards
		3.6 Visual inspection is conducted to confirm termination colour code sequence prior to end-to-end testing of wire and pair termination integrity
		3.7 Cable pairs are inspected, tested and labelled to provide accurate identification in accordance with relevant industry standards
		3.8 TRC/CES/earth wires are terminated with connectors in accordance with relevant industry standards and manufacturer specifications
		3.9 TRC/CES/earth wire continuity is maintained throughout and interface requirements and electrical systems are observed
		3.10 TRC/CES/earthing installation is inspected and tested for continuity, insulation resistance and conductive resistance in accordance with industry standards
		3.11 Compatibility of alterations with existing systems and new work is confirmed and tested in isolation and integrated with existing systems
		3.12 Workplace procedures for referring unplanned events to immediate supervisor for directions are followed
		3.13 Cabling is terminated without waste of materials, energy and/or damage to apparatus, the surrounding environment and/or services

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		3.14	Quality checks are carried out and defects rectified to ensure cabling is in accordance with workplace procedures and relevant industry standards
4	**Complete cabling work records and reporting**	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		4.2	Worksite is cleaned and made safe in accordance with workplace procedures
		4.3	Cabling completion advice is documented and reported in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Cabling installations must include at least the following:	• single telephone line (two-pair) and directly connected to telephone sockets

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF101A Install and connect cabling for direct access to telecommunications service.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0003 Install and connect cabling for direct access to telecommunications service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- terminating at both network termination device and at least two different outlet types and locations
- placing of cables on support structures and building faces for both internal and external locations
- securing cables correctly for above locations
- avoiding cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, and bending radius
- reading and interpreting drawings related to outlet and service entry location
- conducting and interpreting cable test results
- correctly interpreting and applying standards and regulations
- completing the required documentation
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control methods
- completing cabling work records and reporting
- inspecting and testing cables and earth wires
- installing support structure against damage during installation and general operation
- installing cable without waste of materials, energy, services, damage to apparatus and the surrounding environment
- labelling telecommunication outlet ends of cable
- laying and connecting cabling for direct access to telecommunication services
- obtaining and checking tools, equipment and testing devices
- preparing cabling for direct access to telecommunication services
- terminating cables and earth wires
- terminating telecommunications reference conductor (TRC)/communications earth system (CES)/earth wires.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- telecommunications restricted cabling provider rules (CPR) regulations and installations, safe working practices and relevant standards, codes and regulations, including:
  - telecommunication industry overview encompassing:
    - telecommunication industry
    - overview of telecommunications network
    - overview of Telecommunications Act 1997
    - role of Australian Communications Media Authority (ACMA) and ACIF
    - telecommunications terminology
  - telecommunication technical standards encompassing:
    - ACMA Technical Standards TS008 and TS009
    - SAA Communications Cabling Manual (restricted) (starter kit) as approved by relevant bodies – Standards Australia/ACIF
    - international standards – ISO, IEC and ITU
    - Building Code of Australia (BCA)
    - AS/NZS 3000
    - National Association of Testing Authorities (NATA)
  - CPR encompassing:
    - ACMA
    - telecommunications CPR
    - CPR registration
    - old telecommunication licensing structures
    - inspection of work
    - documentation – TCA1 form
  - cable type and identification encompassing:
    - cable types – unshielded twisted pair, shielded twisted pair, indoor, underground and aerial
    - cable construction
    - cable identification – codes (colour, banded, numbered and lettered)
  - cable installation encompassing:
    - cable damage
    - cable packaging
    - cable dispensing devices
    - cable insertion and hauling
    - lead-in conduit requirements (including wall box installation)
    - wiring diagrams

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    - segregation of cables
    - aerial cable fittings and additional safety aspects required
- termination of telecommunication cables encompassing:
    - sheath stripping – methods and precautions
    - pair identification
    - end-to-end testing
    - filled cable termination
    - termination systems – telephone outlets and sockets, and network terminating devices (NTD)
    - connector jointing e.g. external to internal cable where required
- telecommunication earthing and protection encompassing:
    - customer lightning protection (CLP)
    - CLP earthing
    - carrier's policy requirement covering materials (including surge suppression devices) and
    - practices (including earth bonding arrangements)
- basic telephony encompassing:
    - basic telephone service
    - telephone
    - exchange number
    - connection equipment/lead-in cable
    - dialling signals – pulse dialling, tone dialling and ring equivalence number (REN)
- problem-solving techniques
- relevant earthing requirements
- relevant industry standards
- relevant manufacturer specifications and operating instruction
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant TRC/CES/earth wires
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do

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so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to laying and connecting cabling for direct access to telecommunication services
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0004 Install and connect data and voice communication equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and connect data and voice communication equipment.

It includes working safely, preparing and installing communications equipment, and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

UEEDV0008 Install, modify and verify coaxial and structured communication copper cabling

UEEDV0006 Install and modify optical fibre performance data communication cabling

AND

UEECD0043 Solve problems in direct current circuits

OR

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install communications equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.4 Installation of communications equipment is prepared in consultation with others and sequenced appropriately
	1.5 Scope of work is determined from documentation and/or discussion with relevant person/s for work to be undertaken
	1.6 Location of communications equipment and associated equipment is planned within the constraints of the building structure, significants and relevant industry standards
	1.7 Advice is sought from relevant person/s to ensure the work is coordinated effectively with others
	1.8 Material needed for the installation work is obtained in accordance with workplace procedures and job requirements
	1.9 Tools, equipment and testing devices required for installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures
2 Install communications equipment	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Communications equipment tests are carried out in accordance with WHS/OHS requirements and

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		workplace procedures
	2.3	Communications equipment is installed with sufficient access to affect terminations, adjustments and maintenance in accordance with job requirements and relevant industry standards
	2.4	Cabling is terminated at communications equipment in accordance with manufacturer requirements and relevant industry standards
	2.5	Methods for dealing with unplanned situations are discussed with relevant person/s for approval and documented
	2.6	Unplanned situations are dealt with safely and with the approval of an authorised person/s
	2.7	Quality checks of the installed communications equipment are conducted in accordance with workplace procedures
	2.8	Communications equipment installation is carried out efficiently without waste of materials or damage to communications equipment, circuits, surrounding environment and/or services using sustainable energy principles
3 Complete and report installation activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to ensure that the installed communications equipment is in accordance with relevant industry standards
	3.4	‘As-installed’ communications equipment is documented and relevant person/s notified in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and connecting must include the following:	• at least three different types of voice and data communications equipment • at least three types of communications cable

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF109A Install and connect data and voice communication equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0004 Install and connect data and voice communication equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out communications equipment installation without waste of materials or damage to communications equipment, circuits, surrounding environment and/or services using sustainable energy principles
- completing and reporting installation activities
- completing required documentation
- connecting communications equipment
- dealing with unplanned events
- dealing with unplanned situations
- installing communications equipment and associated equipment
- installing communications equipment with sufficient access to affect terminations, adjustments and maintenance
- obtaining and checking tools, equipment and testing devices
- placing and securing communications equipment accurately
- planning location of communications equipment and associated equipment
- preparing to install communications equipment and associated equipment
- terminating cabling
- testing communications equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- analogue and digital signals
- basics of encoding networking signals
- internet services

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- local area network (LAN) architectures
- network signal propagation
- networking protocols and the open systems interconnection (OSI) model
- problem-solving techniques
- relevant building structure and significants
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- sustainable energy principles
- transmission control protocol (TCP)/internet protocol (IP)
- types of networks, network components and hardware.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing and connecting voice and data communications equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Errors that don't impact unit outcomes in the Range of Conditions, Performance and Knowledge Evidence were corrected.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and maintain telecommunications cabling in buildings and premises.

It includes working to relevant regulations, legislation, codes of practice and industry standards and to Australian Communications and Media Authority's (ACMA) Telecommunications Cabling Provider Rules; installing multiple telecommunication lines for multiple access to telecommunication services; terminating at telecommunication outlets, termination modules and distributors; testing for compliance and completing cabling documentation.

This unit applies to customer cabling terminated on distributors and to the installation, maintenance and modification of indoor, external, underground cabling and customer cabling and may be used to connect devices for a range of applications, including telecommunications phones, data (video and multimedia) and security (alarms and fire protection).

Work functions in the occupational areas where this unit may be used are subject to regulatory requirements. Refer to the UEE Electrotechnology Training Package Companion Volume Implementation Guide or the relevant regulator for specific guidance on requirements.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

AND

UEECD0043 Solve problems in direct current circuits

OR

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UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain cabling	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures and workplace procedures are implemented
	1.3 Nature and location of the work is determined from documentation or relevant person/s to determine scope of work to be undertaken
	1.4 Cable routes are planned within the constraints of the building structure and in accordance with relevant regulations, legislation, codes of practice and industry standards
	1.5 Earthing requirements are determined in accordance with existing earthing arrangements, where applicable, and cable system, earth upper and lower resistance limitations
	1.6 Advice is sought from relevant person/s to ensure work is coordinated effectively with others
	1.7 Materials required for the work are obtained in accordance with workplace procedures
	1.8 Tools, equipment and testing devices required for the

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		work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Install and maintain cabling	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Installed support structure is checked for compliance to ensure cable will not be exposed to damage during installation and general operation
	2.3	Catenary supports are secured to building structure and tensioned, as required, to ensure cable weight can be carried in operating conditions, with interference and safety segregation maintained in accordance with relevant regulations, legislation, codes and standards
	2.4	Protective earthing of metal work is installed in accordance with job requirements and industry standards
	2.5	Cables/wires are installed in accordance with manufacturer application, tension and bending stress requirement specifications
	2.6	Sufficient cable excess is allowed at cable ends to facilitate termination in accordance with workplace procedures
	2.7	Cable ends terminating at a telecommunication outlet are labelled in accordance with industry standards
	2.8	Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards
	2.9	Cable ties are tightened correctly and safely in accordance with workplace procedures and industry standards
	2.10	Customer cabling is installed in accordance with relevant regulations, codes of practice and industry standards
	2.11	Surge suppression devices are fitted to all cable pairs as required with the devices protectively earthed in accordance with relevant regulations, codes of practice and industry standards
	2.12	Telecommunications reference conductor (TRC)/communications earth system (CES)/protective earth (PE) insulation is protected against damage and TRC/CES and PE are segregated in accordance with

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		relevant regulations, codes of practice and industry standards
	2.13	Cabling is installed without waste of materials and energy or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.14	Regular quality checks are conducted in accordance with workplace procedures to ensure cabling complies with requirements
3 Terminate, inspect and test cables and earth wires	**3.1**	WHS/OHS risk control work measures and workplace procedures for carrying out work are followed
	3.2	Cable sheath is removed to allow for correct termination length and without damage to underlying conductors and their insulation
	3.3	Terminating modules are installed in accordance with manufacturer specifications and cable pairs neatly and sequentially fanned for termination
	3.4	Conductors are terminated in accordance with recommended colour code sequence and using relevant termination tools in accordance with manufacturer guidelines and operating instructions
	3.5	Cable shields are earthed, as required, in accordance with manufacturer specifications, relevant regulations, codes of practice and industry standards
	3.6	Visual inspection is undertaken prior to end-to-end testing of wire and pair termination integrity to confirm termination colour code sequence has been followed
	3.7	Cable pairs are tested and clearly labelled to provide accurate identification in accordance with job requirements and workplace procedures
	3.8	TRC/CES/PE are terminated with connectors in accordance with manufacturer specifications, relevant industry codes of practice and industry standards
	3.9	TRC/CES/PE wire continuity is maintained in accordance with workplace procedures and interface requirements with electrical systems are followed
	3.10	TRC/CES/PE installation is tested for continuity insulation resistance and conductive resistance in

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		accordance with relevant industry standards
	3.11	Earthing system is labelled in accordance with job requirements and workplace procedures
	3.12	New work is tested both in isolation and when integrated with existing systems, and compatibility of alterations with existing systems is confirmed
	3.13	Cabling is terminated without waste of materials and energy or damage to apparatus, the surrounding environment or services
	3.14	Regular quality checks are conducted and any defects rectified to ensure cabling complies with requirements
4 Complete cabling work records and reporting	**4.1**	WHS/OHS risk control measures and procedures for work completion are followed
	4.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	Record sheets, plans of cable location type and infrastructure are accurately created or updated and stored in accordance with customer requirements and workplace procedures
	4.4	Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with relevant regulations, codes of practice and industry standards
	4.5	Telecommunications cabling advice (TCA 1) is documented and reported in accordance with requirements and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Cable laying and connecting to larger commercial and industry installations must include:	• multi-pair cables • multi-story buildings • termination modules and distributors
Terminating systems at both distributor and outlet locations must include:	• two jumperable distributors with one having a capacity of 100 pair or greater • a cable in excess of 20 pair and a 4 pair

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF102A Install and maintain cabling for multiple access to telecommunication services.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Errors that don't impact unit outcomes in the Range of Conditions, Performance and Knowledge Evidence were corrected.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - using risk control measures
- accessing and interpreting telecommunication systems diagrams
- planning cable route within building constraints
- checking tools, equipment and testing devices for correct operation and safety
- laying and connecting cables for multiple access to telecommunication services, including:
  - terminating cabling at both distributor and outlet locations with one cable being greater than 20prs, one cable of 20pr or less and one 4pr cable installing and terminating two jumperable distributors with a capacity of 100 pair or greater
  - allowing excess cable to terminate
  - labelling outlet ends in accordance with industry standards
  - securing cables in accordance with industry standards
  - reading and interpreting drawings related to cable layouts, outlet location, cable coding system, identifiers and distributor locations
  - installing and termination a network termination device (NTD)
- determining earthing requirements and earthing conductors within resistance limitations
- segregating and protecting telecommunications reference conductors (TRC)/communications earth systems (CES)/protective earth (PE) wires against damage
- installing surge suppression devices
- completing documentation in accordance with industry standards and telecommunications carrier requirements

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- terminating and testing cables
- commissioning a telecommunications cabling system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- customer interfaces, devices and system distribution
- installation and termination requirements, including:
  - Australian Communications and Media Authority (ACMA) regulations and requirements
  - technical standards
  - relevant manufacturer specifications
  - compliance with current Australian Standards, including AS/CA S009 Installation requirements for customer cabling (Wiring Rules)
- Cabling Provider Rules, including:
  - cabling registrars, auditors and inspectors
  - mandatory and voluntary requirements for cabling work
  - registration
- general installation requirements, including:
  - Cabling Provider Rules requirements
  - earth potential rise
  - catenary cabling systems
  - optical fibre and coaxial cabling systems
  - conduits
- cable distribution devices, including:
  - cable distribution devices
  - clearances
  - general requirement
- network boundaries, including:
  - terminations
  - hazards
  - regulations
- indoor cabling, including:
  - general requirements for indoor cabling
  - required minimum clearances
  - damp situations
  - cables in lift and hoist shafts
- underground cabling, including:
  - requirements for underground cabling

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    - minimum depth cover
    - protection of underground cabling
    - segregation from other services
- aerial cabling, including:
    - requirements for aerial cabling
    - minimum clearances
    - segregation requirements
- earthing protection, including:
    - earthing requirements
    - function of earthing
    - TRC/CES/PE purposes
    - TRC/CES earthing installation tests
    - earthing systems
    - earthing of equipment
    - equipotential bonding
- surge suppression and system purpose, types and operation
- miscellaneous regulations, including:
    - cabling in heritage buildings
    - cabling in public places
    - cabling in hazardous areas
- cable identification, including:
    - plans and drawing
    - labelling
    - documentation
- telecommunication cable types including:
    - construction
    - transmission characteristics
    - applications
- cable installation, including:
    - hazards
    - cable damage prevention
    - cable dispensers
    - cable enclosures
    - types
    - fixing
    - regulations
    - distribution boxes and back mounts
- techniques for general cable installation, including:
    - correct cable length for termination
    - cable identification and labelling

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    - unique label outlet ends of cable match identifier
    - cable damage prevention
    - fixing of cables to support stems
    - maintaining ground clearance and hazardous clearances
- techniques to terminate and test, including:
    - removal of cable sheath
    - install terminating modules
    - terminate conductors
    - termination boundaries
- earthing concepts, including:
    - earthing cable shield
    - testing
    - earth of metallic barriers
    - purpose of earth testing instruments
    - earth potential rise
    - earthing test procedures
    - interpretation of results
- cable shielding and interference, including:
    - electromagnetic interference (EMI)/radio frequency interference (RFI) principles
    - sources
    - reduction techniques
    - earthing cable shields
    - interference segregation
- end-to-end testing, including:
    - pair termination integrity
    - cable pairs labelling
    - surge suppression devices
- hazards, including:
    - electronic components and circuits
    - printed circuit boards
    - physical
    - static discharge
    - chemical.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- two jumperable distributors with a capacity of 100 pair or greater
- a cable in excess of 20 pair, a cable of 20 pair or less and a 4 pair
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0006 Install and modify optical fibre performance data communication cabling

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and modify optical fibre performance data communication cabling.

It includes working safely, installing optical fibre cabling, terminating at distributors, testing and compliance checks, and completing cabling documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install and modify optical fibre cabling**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
		1.2 Installation and modification of wiring is prepared in consultation with others and sequenced appropriately
		1.3 Scope of work is determined from documentation and/or discussions with relevant person/s
		1.4 Advice is sought from relevant person/s to ensure work is coordinated effectively with others
		1.5 Material required for the installation work is obtained in accordance with workplace procedures and job requirements
		1.6 Tools, equipment and testing devices required for the installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.7 Preparatory work is checked to ensure no damage has occurred and is in accordance with workplace procedures and relevant industry standards
2	**Install and modify optical fibre cables**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2 Optical fibres are tested for optical continuity
		2.3 Cables are installed and modified with sufficient excess to affect terminations in accordance with manufacturer specifications, relevant industry standards and job requirements
		2.4 Methods for dealing with unplanned situations are discussed with relevant person/s for approval and documented in accordance with workplace procedures
		2.5 Unplanned situations are dealt with safely and with the approval of relevant person/s
		2.6 Quality checks of the installed wiring are conducted in accordance with workplace procedures
		2.7 Cable installation and modification is conducted without waste of materials, damage to apparatus, circuits or

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		surrounding environment using sustainable energy practices
3 Terminate optical fibre cables	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Cable termination work area and optical fibre cables are cleaned and safety measures implemented in accordance with WHS/OHS requirements and workplace procedures
	3.3	Cables are prepared for termination in accordance with manufacturer specifications and relevant industry standards
	3.4	Optical fibre connectors are fitted in accordance with manufacturer specifications and relevant industry standards
	3.5	Relevant methods are used to splice optical fibre cables in accordance with WHS/OHS requirements, manufacturer specifications and relevant industry standards
	3.6	Cable performance tests are conducted and results documented
	3.7	Causes of defects indicated by test results are identified and rectified
	3.8	Unplanned situations are dealt with safely and with the approval of relevant person/s
	3.9	Quality checks of the installed wiring are conducted in accordance with workplace procedures
	3.10	Cable terminations are completed without waste of materials, damage to apparatus, circuits or surrounding environment using sustainable energy practices
4 Document installation and modification and verify optical fibre cabling performance	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	Final checks to the installed cabling are conducted in accordance with job requirements

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4.4 Documentation certifying system performance is issued to a relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing or modifying cabling must include at least two of the following:

- performance optical fibre cables

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF105A Install and modify optical fibre performance data communication cabling.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0006 Install and modify optical fibre performance data communication cabling

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including applying risk control measures
- completing documentation
- conducting cable performance tests and documenting results
- dealing with unplanned events
- documenting installation and modification and verifying optical fibre cabling performance
- identifying and rectifying anomalies
- identifying and rectifying defects
- installing and modifying optical fibre cables
- obtaining and checking tools, equipment and testing devices
- preparing and terminating each type of cable in accordance with relevant industry standards
- preparing to install and modify optical fibre cabling
- routing, placing and securing cables in accordance with relevant industry standards
- terminating cable in accordance with manufacturer specifications and relevant industry standards
- terminating optical fibre cables
- testing optical fibres for optical continuity.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- building construction and building codes
- installation and modification
- installation of cables
- optical fibre principles of operation
- optical fibre safety - hazards

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- optical fibre safety - laser
- optical theory
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including risk management principles
- relevant workplace documentation, including administration and management records
- relevant workplace quality, policies and procedures
- support structures and fixings
- sustainable energy principles
- terminating of fibre cables
- testing of optical fibre cables.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing and modifying performance data communication optical fibre cabling
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0007 Install underground communication cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install underground communication cables.

It includes working safely, preparing and filling trenches, placing conduits and ducts, drawing cables and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install underground communication cables	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risks are identified, and risk control measures and workplace procedures are followed in preparation for the work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Cabling installation is prepared in consultation with others affected by the work and sequenced in accordance with workplace procedures
	1.5 Scope of the work is determined from documentation and/or discussions with relevant person/s to establish the work to be undertaken
	1.6 Cable routes are planned in accordance with the precinct, structure, significants and relevant industry standards
	1.7 Advice is sought from relevant person/s to ensure the work is coordinated effectively with others
	1.8 Material required for installation work is obtained in accordance with workplace procedures and job specifications
	1.9 Tools, equipment and testing devices required for the installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked to ensure no damage has occurred in accordance with job specifications requirements
2 Install underground communication cables	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Trenching is checked in accordance with job specifications and relevant industry standards
	2.3	Ducts/conduits are laid in accordance with job specifications and relevant industry standards
	2.4	Cables are drawn-in without stain or damage in accordance with job specifications and relevant industry standards
	2.5	Cable ends are protected from damage in preparation for termination
	2.6	Methods for dealing with unplanned situations are discussed with relevant person/s for approval and documented in accordance with workplace procedures
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Quality checks of the installed wiring are undertaken in accordance with workplace procedures
	2.9	Cable installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Document and verify installation of underground communication cables	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Documentation of cable installation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF113A Install underground communication cables.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0007 Install underground communication cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- reading and interpreting drawings related to cable schedules and routes
- installing ducts/conduits below ground correctly
- drawing in cables without strain or damage
- protecting cable ends
- completing the necessary documentation accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out cable installation efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
- checking trenching in accordance with job specifications and relevant industry standards
- documenting and verifying installation of underground communication cables
- installing underground communication cables
- obtaining material required for installation work
- obtaining tools, equipment and testing devices required for the installation work and checking for correct operation and safety
- preparing to install underground communication cables.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- telecommunication underground cabling requirements and techniques, safe working practices and relevant standards, codes and regulations, including:
  - hazards and control measures in underground cabling working environment:
    - risk management and assessment of risk:
      - principle and purpose of risk management
      - processes for conducting a risk assessment

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- hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents:
  - parts of an electronic systems and equipment that operate at LV and ELV
  - parts of an electronic systems and equipment where high currents are likely
- risks and control measures associated with high voltage (HV):
  - parts of an electronic systems and equipment that operate at HV
  - the terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of HV
  - control measures used for dealing with the hazards of HV
- risks and control measures associated with LV:
  - risks associated with installation, fault finding, maintenance and repair
  - control measures before, while and after working on electronic systems or equipment
  - isolation and tagging-off procedures
  - risks and restrictions in working live
  - control measures for working live
- risks and control measures associated with trenches:
  - identification of trenching conditions
  - notification of relevant authorities/utilities and permits
  - digging and trenching equipment safety
  - methods of shoring
  - public safety
  - personal safety equipment
- telecommunication below ground cabling:
  - types and purposes of mechanical and manual aids
  - purpose, location, and capacity of manholes and pits
  - types of underground cable
  - procedure for the excavation of a site for the installation of a manhole, pit, pipe and conduit
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant tools, equipment and testing devices
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- sustainable energy practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing underground communication cables
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0008 Install, modify and verify coaxial and structured communication copper cabling

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install, modify and verify coaxial and structured communication copper cabling in buildings and premises intended for connection to a telecommunications network as permitted by the Australian Communications and Media Authority (ACMA).

It includes working safely to industry standards; installing generic, structured twisted pair cabling (category 5 and above) and coaxial cabling that terminate at distributors, termination modules and telecommunication outlets; testing for compliance; and completing cabling documentation.

Work functions in the occupational areas where this unit may be used are subject to regulatory requirements. Refer to the UEE Electrotechnology Training Package Companion Volume Implementation Guide or the relevant regulator for specific guidance on requirements.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and/or modify copper cabling	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures are implemented
	1.3 Installation or modification of wiring is coordinated after consultation with relevant person/s affected by the work
	1.4 Nature and location of work is obtained from relevant person/s and/or documentation, diagrams, cable layout drawings and cable schedules to determine the scope and details of work to be undertaken
	1.5 Cable routes are planned in accordance with relevant regulations, constraints of the building structure, fire walls, cultural/heritage requirements and regulations
	1.6 Advice is sought from relevant person/s to ensure work is coordinated effectively with others
	1.7 Material required for the installation work is determined and obtained in accordance with workplace procedures and checked against job requirements
	1.8 Tools, equipment and testing devices required for the installation are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9 Preparatory work is checked to ensure compliance with regulations, workplace procedures, safety and job requirements
2 Install or modify copper cables	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Cables are installed or modified with sufficient excess to affect terminations in accordance with manufacturer specifications, technical standards and job requirements
	2.3	Cable installation/modification is carried out without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices
3 Terminate copper cables	**3.1**	WHS/OHS risk control measures and procedures for work completion are followed
	3.2	Cable termination work area is cleaned and safety measures implemented
	3.3	Cables are prepared for termination in accordance with manufacturer specifications, technical standards and workplace procedures
	3.4	Surge suppression devices are fitted to cables with metallic components in accordance with manufacturer specifications, technical industry standards and workplace procedures
	3.5	Cable shields are earthed in accordance with manufacturer specifications, technical standards and workplace procedures
	3.6	Twist ratio of generic, structured metallic cables is maintained in accordance with manufacturer specifications and technical standards
	3.7	Twisted pair cables are terminated in accordance with manufacturer specifications, technical standards and workplace procedures
	3.8	Cable performance tests are conducted accurately and results documented in accordance with workplace procedures
	3.9	Cause of defects indicated by inspection and test results are identified and rectified in accordance with manufacturer specifications, technical industry standards and workplace procedures
	3.10	Regular quality checks of the installed wiring are undertaken in accordance with workplace procedures
	3.11	Cable terminations are carried out without waste of

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		materials, damage to apparatus, circuits or the surrounding environment and using sustainable energy practices
4 Verify and document copper cabling installation and performance	**4.1**	WHS/OHS risk control measures and workplace procedures for work completion are followed
	4.2	Final checks are made to installed cabling to ensure it conforms to performance requirements and regulations
	4.3	Telecommunications cabling advice (TCA) forms are completed in accordance with workplace procedures and issued to relevant person/s
	4.4	Worksite is cleaned and made safe in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, modifying and verifying coaxial and structured communication copper cabling must include:

- distributor frames
- patch panels
- a range connectors/outlets
- a range of cable types

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF104A Install, modify and verify coaxial and structured communication copper cabling.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0008 Install, modify and verify coaxial and structured communication copper cabling

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including applying risk control measures
- obtaining correct materials, tools and equipment to undertake the work
- checking tools, equipment and testing devices for correct operation and safety
- installing, terminating and testing unshielded twisted pair (UTP), FTP or shielded twisted pair (STP) customer cables that are rated Category 5 or above
- installing, terminating and testing coaxial cable installation systems
- installing and modifying performance data communication copper cabling, including:
  - reading and interpreting drawings and diagrams related to cable layouts, schedules and apparatus locations
  - routing, placing and securing cables to comply with industry standards
  - preparing and terminating each type of cable to comply with industry standards
  - ensuring copper cables are installed or modified with sufficient excess to affect terminations
  - maintaining twist ratio of generic, structured twisted pair copper cables
  - earthing cable shields
  - fitting surge suppression devices
  - conducting cable performance tests
- completing necessary documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- telecommunication cable types, including:
  - construction
  - transmission characteristics

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    - applications
- cable identification, including:
    - plans and drawing
    - labelling
    - documentation
- cable installation, including:
    - hazards
    - cable damage prevention
    - cable dispensers
- distributors and distributor enclosures, including:
    - types
    - regulations
    - termination interfaces
- termination methods and requirements
- category 5 and above generic, structured cabling, including:
    - design principles
    - functional elements
    - cabling sub-systems
- uses and construction of category UTP, FTP and STP generic and coaxial structured cabling installation systems
- performance requirements for structured cabling, including:
    - approved practices
    - safety requirements
    - connectors
    - terminating tools
    - continuity tests
    - fault diagnosis
    - recording results
- testing and commissioning structured cabling systems
- constraints of building structure, fire walls and cultural/heritage requirements
- techniques to identify and rectify faults/defects.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational

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situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0009 Select and arrange data and voice equipment for local area networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select and arrange data and voice equipment for local area networks (LANs).

It includes selecting compliant equipment, arranging locations of equipment and cable routes, applying solutions based on calculated measures and completing network documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

UEEDV0008 Install, modify and verify coaxial and structured communication copper cabling

UEEDV0006 Install and modify optical fibre performance data communication cabling

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to select equipment	**1.1** Scope of work communications network is determined from documentation and/or discussions with relevant person/s
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for the communications network area are identified, obtained and applied
2 Arrange locations of equipment and cable routes	**2.1** Location of equipment is arranged in accordance with job specifications and relevant industry standards
	2.2 Cable routes are planned to ensure maximum lengths in accordance with relevant industry standards and manufacturer specifications
	2.3 Cable routes are planned in accordance with job specifications and relevant industry standards
	2.4 Earthing is arranged in accordance with job specifications and relevant industry standards
3 Select cables and equipment	**3.1** Cable types are selected for the environment/s and performance requirements in accordance with job specifications and relevant industry standards
	3.2 Cable sizes are selected for capacity and performance requirements in accordance with job specifications
	3.3 Earthing components are selected for earthing requirements in accordance with job specifications and relevant industry standards
	3.4 Network equipment is selected in accordance with WHS/OHS requirements and relevant industry standards

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	3.5	Electronic equipment types are selected for the environment/s and performance requirements in accordance with job specifications and relevant industry standards
4 Document communications network	**4.1**	Justifications for selections of cable and electronic equipment and relevant calculations are documented in accordance with workplace procedures
	4.2	Communications network arrangement and specifications for all selected items are documented in accordance with workplace procedures and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting and arranging equipment for LANs, comprising a distribution frame, must include at least the following:	• two fibre outlets • 20 sets of two data outlets • one private automatic branch exchange customer access equipment (CAE) • or Virtual PBX • one server

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF110A Select and arrange data and voice equipment for local area networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0009 Select and arrange data and voice equipment for local area networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- arranging earthing in accordance with job specifications and relevant industry standards
- arranging locations of equipment and cable routes
- arranging network equipment
- documenting communications network
- documenting installation arrangements and specifications for items selected and reasons for the selections made
- documenting justifications for selections of cable and electronic equipment
- planning cable routes in accordance with job specifications and relevant industry standards
- preparing to select equipment
- selecting appropriate earthing components
- selecting cables and equipment
- selecting electronic equipment types
- selecting types and sizes of cables.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- local area network (LAN) fundamentals
- performance of copper or fibre installation and termination
- customer switching system (CSS) customer access equipment (CAE)
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- switches, hubs and routers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to selecting and arranging equipment for LANs
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0010 Select and arrange equipment for wireless communication networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select and arrange equipment for wireless communication networks.

It includes selecting compliant equipment, developing wireless communication network arrangements, complying with regulations (based on calculations), justifying solutions and completing network documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to select equipment	**1.1** Scope of the communications network is determined from job specifications
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) processes and relevant industry standards

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		for the wireless network area are identified, obtained and applied
2	**Arrange locations of equipment and cable routes**	**2.1** Location of equipment is arranged in accordance with job specifications and relevant industry standards
		2.2 Cable routes are planned to ensure maximum lengths in accordance with relevant industry standards and manufacturer specifications
		2.3 Cable routes are planned in accordance with job specifications and relevant industry standards
		2.4 Earthing is arranged in accordance with job specifications and relevant industry standards
3	**Select cables and equipment**	**3.1** Cable types are selected and installed for the environments in accordance with job specifications and relevant industry standards
		3.2 Cable sizes are selected in accordance with job specifications and relevant industry standards
		3.3 Earthing components are selected in accordance with job specifications and relevant industry standards
		3.4 Network equipment is selected and documentation obtained in accordance with WHS/OHS requirements
		3.5 Electronic equipment is selected for the environments in accordance with job specifications and relevant industry standards
4	**Document communications network**	**4.1** Justification for selection of equipment and calculations are documented in accordance with workplace procedures
		4.2 Wireless network equipment for arrangement and specifications for all selected items are documented in accordance with workplace procedures and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF108A Select and arrange equipment for wireless communication networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0010 Select and arrange equipment for wireless communication networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- arranging and selecting earthing components
- arranging earthing
- arranging locations of equipment and cable routes
- arranging network equipment
- documenting installation arrangement, specification for items selected and reasons for the selections made
- documenting justification for selection and calculations
- planning and selecting types and sizes of cables
- planning cable routes
- selecting electronic equipment types for the environment
- selecting network equipment and obtaining documentation of equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- operating systems and networks
- relevant cable routes and earthing
- relevant cables, components and equipment
- relevant industry standards
- relevant manufacturer specifications and installing instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:

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  - wireless network documentation
- relevant workplace policies and procedures
- wireless network components for local area networks (LANs) and wide area networks (WANs)
- wireless network configurations
- wireless network security.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to selecting and arranging equipment for wireless networks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0011 Set up and configure basic data communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and configure basic data communication systems.

It includes working safely, installing data communications hardware, installing and configuring data communications software, and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0003 Assemble, set up and test computing devices

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up and configure data communication systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Set-up and configuration work are determined from job specifications and in consultation with relevant person/s
	1.3	Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.4	Hardware and software required for work are obtained in accordance with workplace procedures and job specifications
	1.5	Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures and job specifications
2 Set up, configure and maintain data communication equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Layout of data communications hardware cabling and outlets is determined from job specifications and/or in consultation with relevant person/s
	2.3	Hardware is installed in accordance with the data communications system requirements
	2.4	Data communications software is installed and configured in accordance with network requirements
	2.5	Data communications operations are tested and anomalies identified and corrected
	2.6	Reported data communications failures and faults are reviewed and relevant tools and methods are used in accordance with workplace procedures
	2.7	Identified causes of reported problems are rectified and the data communications link is tested in accordance with workplace procedures
	2.8	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.9	Set-up configuration and maintenance are carried out efficiently without waste of materials or damage to apparatus, surrounding environment and/or services using sustainable energy practices
3 Complete work and	**3.1**	WHS/OHS risk control work completion measures and

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document activities		workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Data communications configuration and maintenance records are maintained in accordance with workplace procedures
	3.4	Service report is completed and forwarded to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and configuring data communications systems must include at least the following:	• communication modem/s • communication port/s

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF114A Set up and configure basic data communication systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0011 Set up and configure basic data communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out set-up configuration and maintenance efficiently without waste of materials or damage to apparatus, surrounding environment and/or services using sustainable energy practices
- completing work and documenting activities
- dealing with unplanned situations
- determining layout of data communications hardware cabling and outlets
- determining the extent of work schedule
- documenting network configurations and activity results for future referencing
- finding the cause of faults
- identifying and correcting anomalies
- installing and configuring software to requirements
- installing data communications software
- installing hardware
- laying out network in accordance with job specifications
- obtaining specified hardware and software
- preparing to set up and configure data communication systems
- rectifying identified causes of reported problems
- reviewing reported data communications failures and faults
- setting up, configuring and maintaining data communication equipment
- testing data communications operations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- characteristics and limitations of the types of transmission media
- communications configuration and maintenance records
- problem-solving techniques
- process of data transmission
- protocols
- relevant data communications software
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including communications configuration and maintenance records
- relevant workplace policies and procedures
- sustainable energy principles
- types, characteristic specifications and limitations of fibre optic systems
- types, characteristics and limitations of modems and interface standards.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up and configuring basic data communications systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0012 Set up and configure the wireless capabilities of communications and data storage devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and configure the wireless capabilities of communications and data storage devices.

It includes applying safe working practices, checking device software installation, following work instructions and procedures, and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter operating instructions	**1.1** Work supervisor and/or customers are consulted to determine functions of the device and relevant parameter/s
	1.2 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation

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		and safety
	1.3	Device installation is checked in accordance with job specifications and relevant industry standards
2 Enter operating instructions	**2.1**	Status of relevant function of the device is entered and parameters set in accordance with manufacturer specifications
	2.2	Entered data is checked in accordance with workplace procedures and job specifications
	2.3	Workplace procedures for referring unplanned events to supervisor for directions are followed
3 Test device operation and report	**3.1**	Device operation is tested
	3.2	Operating anomalies are identified and corrected in accordance with workplace procedures
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Work completion is reported and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Entering and verifying operating instructions must include at least two types of microprocessor equipped devices with built-in icon-based programmable functions of the following:

- programmable relays
- timers
- temperature controllers
- detection devices for security and fire

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEF107A Set up and configure the wireless capabilities of communications and data storage devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0012 Set up and configure the wireless capabilities of communications and data storage devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- correcting programming anomalies
- dealing with unplanned events
- entering functions and parameters correctly
- entering operating instructions
- identifying operating anomalies of device installation
- identifying required operating functions and parameters
- obtaining and checking tools, equipment and testing devices required to carry out work
- preparing to enter operating instructions
- verifying device operation
- testing device operation and completing reports.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating principles at sub-system level
- programming functions
- relevant device functions and parameters
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up the wireless capabilities of communications and data storage devices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0013 Solve problems in voice and data communications circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in voice and data communications circuits.

It includes working safely; applying problem-solving procedures; using basic voltage, current and resistance measuring devices; and providing known solutions to predictable communication circuit problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Data and Voice

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on voice and data communications circuits	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3	Scope of circuit/s problem is obtained from documentation and/or from work supervisor to determine the work to be undertaken
	1.4	Advice is sought from the work supervisor to ensure work is coordinated with others
	1.5	Sources of materials required for work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Solve identified problems in voice and data communications circuits	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Measured and calculated value routines are used to solve circuit problems for single path, single source circuits
	2.5	Problems are solved without damage to apparatus, circuits, the surrounding environment and/or services using sustainable energy practices
3 Complete work and document problem solving activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve circuit problems is documented
	3.4	Work completion is documented and relevant person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF106A Solve problems in voice and data communications circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0013 Solve problems in voice and data communications circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- altering an existing circuit to comply with specified operating parameters
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- checking and isolating circuits
- completing documentation of justification for solution
- completing work and documenting problem-solving activities
- determining sources of materials required for work
- determining the operating parameters of an existing circuit
- measuring and calculating value routines to solve circuit problems
- obtaining and checking tools, equipment and testing devices required to carry out work
- obtaining the scope of circuit/s problem from documentation and/or from work supervisor
- preparing to work on voice and data communications circuits
- solving identified problems in voice and data communications circuits
- solving problems without damage to apparatus, circuits, the surrounding environment and/or services using sustainable energy practices
- testing and measuring live work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- alternating current (a.c.) principles
- capacitance
- circuit parameter relationships
- direct current (d.c.) resistive circuits
- effects of electrical current
- electrical circuits
- electromotive force (EMF) sources

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- isolation procedures
- magnetism and electromagnetic induction
- measurement instruments (voltage, current and resistance)
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant measurements and calculations values
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles
- testing and measuring of live work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment used in industry
- resources that reflect current industry practices in relation to solve problems in voice and data communications circuits
- applicable documentation including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEDV0014 Test, report and rectify faults in data and voice installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to test, report and rectify faults in data and voice installations.

It includes working safely, conducting performance testing, applying fault-finding procedures, testing functionality of the network, conducting repairs and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEDV0005 Install and maintain cabling for multiple access to telecommunication services

UEEDV0008 Install, modify and verify coaxial and structured communication copper cabling

UEEDV0006 Install and modify optical fibre performance data communication cabling

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Data and Voice

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to test, report and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Testing is prepared in consultation with others affected by work and sequenced in accordance with workplace procedures
	1.3 Scope of the work is determined from documentation and/or discussions with relevant person/s to establish the work to be undertaken
	1.4 Advice is sought from relevant person/s to ensure work is coordinated effectively with others
	1.5 Material needed for testing, reporting and rectifying work is obtained in accordance with workplace procedures and job requirements
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred in accordance with job requirements and workplace procedures
2 Test and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Tests are carried out in accordance with WHS/OHS requirements and workplace procedures
	2.3 Tests are prepared and conducted in accordance with test equipment operating instructions and job requirements

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	2.4	Cable performance tests are conducted and results documented in accordance with workplace procedures
	2.5	Causes of defects and/or faults indicated by test results are identified and rectified in accordance with workplace procedures
	2.6	Methods for dealing with unplanned situations are discussed with relevant person/s for approval and documented in accordance with workplace procedures
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Quality checks of the installed equipment are undertaken in accordance with workplace procedures
	2.9	Testing and rectifying faults is carried out without waste of materials or damage to equipment, circuits, surrounding environment or services using sustainable energy principles
3 Document and verify installation performance	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Service reports are completed as required in accordance with workplace procedures
	3.4	Documentation certifying system performance is issued to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Testing, reporting and rectifying faults in voice	• two different items of customer premises

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and data installations must include at least the following:

equipment
- a local area network (LAN)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEF111A Test, report and rectify faults in data and voice installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEDV0014 Test, report and rectify faults in data and voice installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- carrying out work without waste of materials or damage to equipment, circuits, surrounding environment or services using sustainable energy principles
- completing documentation
- dealing with unplanned situations
- identifying defects/faults from test results
- interpreting test results
- obtaining and checking tools, equipment and testing devices for correct operation and safety
- preparing and conducting tests of faults
- preparing test reports
- rectifying faults
- undertaking quality checks in accordance with workplace procedures
- verifying installation performance.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- causes of non-compliant test results
- networking fundamentals
- optical time domain reflectometer (OTDR) operating principles, applications and calibration procedures
- performance of copper cable measuring devices and techniques
- performance of optical fibre measuring devices and techniques
- performance parameters associated with copper cables, coaxial cables and optical cables
- recording, reporting and maintaining test results

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- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- problem-solving techniques
- test results for compliance with required regulation, standards and/or codes for structured copper cables, coaxial and optical fibre cables
- testing and validation of a customer premises cabling installation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to testing, reporting and rectifying faults in voice and data installations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0001 Analyse the performance of wireless-based electronic communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse the performance of wireless-based electronic communication system.

This includes analysis of wireless-based electronic systems to provide solutions to mobile communications performance. It encompasses working safely, applying extensive knowledge of mobile communications parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting results and solutions for use in design work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse the performance of wireless-based system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3	Extent of the wireless-based electronic system issues are determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4	Work activities are planned to meet scheduled timelines in consultation with other person/s involved in the work
	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Analyse the wireless-based electronic system performance	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work activities are followed
	2.2	Wireless communications principles are applied to analytical solutions to electronic systems
	2.3	Parameters, specifications and performance requirements in relation to wireless-based electronic systems are obtained in accordance with workplace procedures
	2.4	Approaches to analysing wireless-based electronic system parameters are carried out to provide the most effective solution
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Document and report results of wireless-based electronic system performance analysis and actions taken	**3.1**	Solutions to wireless-based electronic system issues are evaluated to determine their effectiveness and modified, as required
	3.2	Analysis is documented, including details of all findings, calculations and assumptions
	3.3	Analysis is reported to appropriate person/s to establish appropriate action to be taken based on findings

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3.4 Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with professional standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Analysing performance of wireless-based electronic systems must include at least the following:

- two wireless-based electronic systems in at least two different contexts

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH183A Analyse the performance of wireless-based electronic - communication systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0001 Analyse the performance of wireless-based electronic communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing wireless-based electronic system performance
- applying sustainable energy principles and practices
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining effective strategies for analysing wireless-based electronic system performance
- determining wireless-based electronic systems performance issues
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- evaluating results of wireless-based electronic communication system analysis
- implementing relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including the use of risk control measures
- obtaining wireless-based electronic systems performance parameters, specifications and performance requirements appropriate to each situation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- fundamentals of wireless security, including:
  - access points
  - antennas
  - application design and site survey preparation
  - bridges
  - emerging technologies
  - network interface cards (NICs)

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  - security
  - troubleshooting, management, monitoring and diagnostics
  - wireless topologies
- networking fundamentals, including:
  - encoding networking signals
  - how information is carried
  - internet services
  - local area network (LAN) architectures
  - network signal propagation
  - networking protocols and the open systems interconnection (OSI) model
  - signal distortion, including attenuation, reflection, noise, dispersion, jitter, latency and collisions, and bit error rate
  - transmission control protocol (TCP)/internet protocol (IP)
  - types of networks, network components and hardware
- relevant industry standards, codes of practice and regulations of Australian Communications and Media Authority (ACMA)
- relevant risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- wireless-based electronic communications system performance, principles and practices
- wireless networks infrastructure, including network configurations and wireless network security.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry

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- resources that reflect current industry practices in relation to analysing the performance of wireless-based electronic systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0002 Assemble and install reception antennae and signal distribution equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble and install reception antennae and signal distribution equipment.

It includes preparing to install and set up reception antennae and signal distribution systems, installing and setting up reception antennae and signal distribution systems and reporting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and set up reception antennae and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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signal distribution systems		for relevant work area are identified, obtained and applied
	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4	Nature and location of the work is obtained from relevant person/s to determine the scope of work
	1.5	Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.6	Materials required for work are determined in accordance with workplace procedures
	1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Install reception antennae and signal distribution systems	**2.1**	Workplace risk control measures and workplace procedures are applied
	2.2	Circuits/components are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3	Optimum location for installation of antenna is determined from signal tests and limitations imposed by the customer and relevant regulations
	2.4	Accessories are installed straight and square in required locations and within acceptable tolerances
	2.5	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.6	Unplanned events are reported to relevant person/s in accordance with workplace procedures
	2.7	Installation is conducted efficiently without waste of materials, damage to apparatus, circuits or the surrounding environment applying sustainable energy practices
3 Set up reception antennae	**3.1**	WHS/OHS work completion risk control measures and

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and signal distribution systems and report		workplace procedures are followed
	3.2	Adjustments are made to the antenna and the system to optimise reception at each outlet
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Relevant person/s is notified of completion of installation work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, connecting and setting up reception antennae and signal distribution systems must include at least the following:	• a reception antenna • a signal distribution system
Systems must consist of at least the following:	• two outlets for two users

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH108A Assemble and install reception antennae and signal distribution equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0002 Assemble and install reception antennae and signal distribution equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- accurately placing and securing antennae and accessories
- adjusting for optimum reception at each outlet
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- correctly terminating cable and conductors
- dealing effectively with unplanned events
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- reading and interpreting drawings of circuit arrangements and component locations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- antenna assembly and installation, including:
  - antenna distribution systems
  - antenna testing, fault finding and repair
  - relevant standards, codes and regulations
  - satellite receivers
  - signal reception
  - transmission line types and characteristics
  - TV antenna types, operating characteristics and terminology
- relevant manufacturer specifications

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- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to assembling and erecting reception antennae and signal distribution equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0003 Assemble and set up basic security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble, set up and install electronic security system with up to 50 connected devices, typically used in single domestic and small commercial premises.

It includes working safely to industry standards, assembling and setting up wired and wireless security system, and connecting security system components.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble and set up wired and wireless security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Hazards which have not previously been identified are reported in accordance with workplace procedures and advice on risk control measures are sought from work supervisor
	1.4 Nature, location and security system required is obtained from supervisor or other relevant person/s and/or workplace documentation to determine the scope and details of work to be undertaken
	1.5 Advice is sought from work supervisor or other relevant person/s to ensure work is coordinated effectively with others
	1.6 Security system and relevant materials required for work are determined and obtained in accordance with workplace procedures
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Assemble wired and wireless security system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS workplace requirements and procedures
	2.3 Security controllers, access, intrusion and surveillance devices are positioned for optimum performance in accordance with workplace procedures and within limitations imposed by customers and regulations

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	2.4	Security system components are installed straight and square in the required locations and within acceptable tolerances in accordance with workplace procedures
	2.5	Cables and conductors are terminated at security system components in accordance with manufacturer specifications and regulatory requirements
	2.6	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	2.7	Security installation is carried out without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Complete and document security systems installation	**3.1**	WHS/OHS risk control measures and workplace procedures for work completion are followed
	3.2	Worksite and equipment are cleaned and made safe in accordance with WHS/OHS requirements and workplace procedures
	3.3	Security system installation is documented in accordance with regulatory requirements and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing security systems must include the following:	• one wired and one wireless security system
Security systems must consist of:	• a controller and access device and at least two other different connected devices both wired and wireless

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH150A Assemble and set up basic security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0003 Assemble and set up basic security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - using risk control measures
  - checking tools, equipment and testing devices for correct operation and safety
  - checking circuits/machines/plant are isolated
  - terminating cables and conductors safely
- applying sustainable energy principles and practices
- assembling and setting up wired and wireless security systems, including:
  - placing and securing devices and security system components accurately
  - terminating cable and conductors correctly
  - completing and documenting installation
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - installing system without waste or damage
- communicating effectively with relevant stakeholders
- complying with relevant electrical regulations
- complying with relevant security regulations and legislations
- consulting with work supervisor
- determining the nature, location and security system required for work
- maintaining a clean worksite and equipment
- obtaining correct system and relevant materials.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- closed-circuit television (CCTV), including application, types of cameras and monitors, switching methods, earthing and ambient lighting
- communication systems, including:
  - Ademco contact ID
  - dialler systems
  - panel to base systems
  - relevant wired and wireless communication methods
- circuit arrangements, including:
  - end line resistors and a range of typical resistor values used in alarm systems
  - wiring of a detector with split end of line (EOL) resistors
  - zone doubling and open circuits and short circuits
- relays, including normally open and normally closed types, transistor as a switch, wiring diagram for a relay connected to an open collector output on an alarm panel, and typical uses for a relay type output
- electro-mechanical detectors, including:
  - active and passive infrared beams
  - renamed magnetic reed switches and optical fibre cable
  - strain system
  - types: ultrasonic, microwave, glass break and smoke
- effective communication techniques
- locations for accessories to be installed
- positioning of security controllers, access, intrusion and surveillance devices for optimum performance
- mechanical detectors, including pressure pads, trip wires, window tape, screens, switches and vibration
- relevant customer-imposed limitations
- relevant electrical industry standards, codes of practice and regulations
- relevant electrical regulations and legislations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant security regulations and legislation, including Acts and industry standards
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- relevant workplace referral and reporting procedures
- security panels, including:
  - batteries and locks commonly used in the security industry
  - features, applications, types, and maintenance of commonly used panels
  - operation of programmable and non-programmable panels

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  - panel to base communication systems
  - power and sound sources used with security alarms
- security controllers, access, intrusion and surveillance devices, including:
  - mechanical detectors
  - electro-mechanical detectors
  - CCTV
  - communication systems
- security system assembly and set-up
- security system components and accessories, including:
  - relays
  - security panels
- techniques to check if circuits/machines/plant are isolated
- techniques to check if tools, equipment and testing devices are operating correctly and safely
- techniques to install security system without damage
- techniques to terminate cable and conductor
- tools, equipment and testing devices
- types of security systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0004 Assemble and set up fixed video/audio components and systems in buildings and premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble and set up fixed video/audio components and systems in buildings and premises.

It includes preparing to install audio/video components and systems, installing audio/video components and systems, completing installation work and reporting.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to install audio/video components and systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures are followed in preparation for the work
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures are sought from the work supervisor
	1.4 Nature and location of the work is obtained from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.6 Materials required for the work are determined in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Install audio/video components and systems	**2.1** Workplace risk control measures and procedures are applied
	2.2 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3 Audio/video components are installed in accordance with relevant industry standards and job specifications with sufficient excess to affect terminations
	2.4 Accessories are installed straight and square in required locations within acceptable tolerances
	2.5 Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.6 Unplanned events are reported to relevant person/s in accordance with workplace procedures
	2.7 Installation is conducted efficiently without waste of materials, damage to apparatus, circuits or the

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		surrounding environment applying sustainable energy practices
3 Complete installation work and report	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Completion of installation is reported to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling and setting up fixed video/audio components and systems must include at least the following:	• assembling and setting up fixed audio/video systems in buildings and premises
Systems must include the following:	• surround sound and multi-room speakers • central audio and home theatre components

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH106A Assemble and set up fixed video/audio components and systems in buildings and premises.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0004 Assemble and set up fixed video/audio components and systems in buildings and premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing relevant documentation, including handing over all system/component documents to the customer
- connecting components in accordance with manufacturer instructions
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system
- placing and securing components and accessories accurately
- reading and interpreting drawings of circuit arrangements and component locations
- setting functional controls to customer's requirements
- terminating cable and conductors correctly
- testing functional operation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures
- video/audio components and system assembly and setting up in buildings and premises, including:
  - electronic safe working practices
- audio reproduction electronic components, including:
  - graphic equalisers
  - power and integrated amplifiers
  - preamplifiers
- audio reproduction and speaker fundamentals
- audio/video recording and replay components repair basics
- audio/video control equipment
- relevant standards, codes and regulations
- sound reproduction fundamentals
- video systems installation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to assembling and setting up fixed audio/video components and systems in buildings and premises
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0005 Assess electronic apparatus compliance

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assess electronic apparatus compliance with relevant industry standards and regulations for certification or approval.

It includes preparing and evaluating electronic apparatus in determining specified compliance requirements, inspecting and setting up performance tests, evaluating inspection and test results, and documenting evaluation outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate electronic apparatus compliance	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Examination and testing areas are checked for safety hazards and risk control measures are implemented in accordance with workplace safety policy and procedures
	1.4 Relevant documentation is obtained and read to determine the certification/approval specifications for which the apparatus/equipment is to be assessed
	1.5 Advice is sought from the relevant supervisor to ensure work is coordinated effectively with others
	1.6 Tools, testing devices and materials needed to carry out work are obtained and checked for correct operation and safety
2 Evaluate electronic apparatus compliance	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out evaluation work are followed
	2.2 Need to inspect, test or measure live work is determined in accordance with WHS/OHS requirements and workplace safety procedures
	2.3 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Operating requirements of the electronic apparatus are identified and applied to the assessment process
	2.5 Apparatus examination, inspection and tests are set up in accordance with certification/approval specifications, test methods and workplace procedures

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	2.6	Apparatus examination, inspection and tests are carried out methodically with results and comments systematically documented in accordance with certification/approval specification requirements
	2.7	Unplanned situations are dealt with safely and with the approval of an authorised person/s
	2.8	Assessment is carried out without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document evaluation results	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Examination, inspection and test results are evaluated and non-compliance issues identified
	3.4	Examination, inspection, test results and comments on non-compliance issues are documented and reported to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assessing electronic apparatus compliance must include at least two different electronic apparatus of the following:	• audio amplifiers • radio and televisions receivers • video displays • audio and video recording/replay devices • two-way radios • cell phones • instrumentation devices

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- control devices

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH147A Assess electronic apparatus compliance.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0005 Assess electronic apparatus compliance

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- identifying electronic apparatus compliance certification/approval specifications
- interpreting compliance documents
- setting up and conducting appropriate examinations, inspections and tests
- evaluating electronic apparatus compliance
- identifying non-compliance defects
- reporting examination and test results and non-compliance issues clearly and accurately
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- completing apparatus assessment and documenting results
- preparing to evaluate electronic apparatus certification/approval specifications compliance.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- compliance certification, including:
  - the purposes of certification of equipment
  - the parties involved in the assessment/testing and certification of equipment
  - the scheme for recognition of assessment/testing and certification
- compliance testing and assessment of electronic apparatus equipment, including:
  - types of assessment, inspection and tests

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    - test set-ups and workplace procedures
    - recording and reporting requirements of conformity assessment
- preparation required to assess equipment for compliance with industry standards, including:
    - documentation required prior to conducting conformity assessment
    - tests necessary to establish that an item of equipment conforms with relevant industry standards
- relevant compliance certification/approval specifications
- relevant job safety assessments or risk mitigation processes, including:
    - safe working practices
- relevant manufacturer specifications
- relevant technical industry standards, regulations, codes of practice for electronic apparatus and WHS/OHS legislated requirements
- relevant workplace documentation, including:
    - as marketed technical performance
    - industry technical standards
    - product quality endorsement standards
    - safety requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to assessing compliance of electronic apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0006 Carry out repairs of predictable faults in video and audio replay/recording apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to carry out repairs of predictable faults in video and audio replay/recording apparatus.

It includes preparing to repair replay/recording apparatus, finding and repairing faults, completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0028 Fault find and repair complex power supplies

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair replay/recording apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the fault is determined from documentation or relevant person/s to determine scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment, testing devices and service manual required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS and workplace procedures
	2.3 Apparatus is checked and isolated, where necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is undertaken methodically applying replay/recording apparatus and circuit principles using measured and calculated values of apparatus parameters and/or with reference to manufacturer service manuals
	2.5 Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6 Faulty components are rechecked and their fault status confirmed

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	2.7	Repairs are undertaken in accordance with manufacturer instructions and approval of relevant person/s
	2.8	Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.10	Repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is provided in the required format for repairs to apparatus
	3.4	Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out repairs of predictable faults in video replay/recording apparatus must include the following:

- at least two predictable faults in two different video replay/recording apparatus

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH117A Carry out repairs of predictable faults in

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video and audio replay/recording apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0006 Carry out repairs of predictable faults in video and audio replay/recording apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- isolating circuits/machines/systems
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- identifying and accessing materials, tools, apparatus and testing devices
- applying methodical fault-finding techniques
- efficiently finding faults
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- audio and video recording and replaying apparatus, including:
  - audio reproduction:
    - electronic components
    - speaker fundamentals
  - audio/video control equipment
  - audio/video recording and replay components repair basics
  - compact disk (CD) players

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  - digital audio
  - digital versatile disc (DVD) and CD
  - DVD processors
  - electronic communications systems
  - relevant industry standards, codes and regulations
  - sound reproduction fundamentals
  - technical manuals and catalogues
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to carrying out repairs of predictable faults in audio and video replay/recording apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0007 Commission electronics and communications systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to commission electronics and communications systems.

It includes undertaking commissioning procedures of electronics and communications systems to comply with predetermined parameters and delivery to client. It also includes working safely, testing system parameters, analysing and adjusting to assure optimum performance, following workplace procedures, and documenting final operating parameters and settings.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare electronics and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	communications system		for a given work area are obtained and applied
		1.2	WHS/OHS risk control measures and workplace procedures in preparation for the electronics work are followed
		1.3	Safety hazards that have not previously been identified are noted on job safety assessment, assessed and risk control measures implemented
		1.4	Appropriate person/s is consulted to ensure the electronics work is coordinated effectively with others involved on the worksite
		1.5	System operating parameters are identified by reviewing system specifications and component technical data
		1.6	Tools, equipment and testing devices needed for the electronics work are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.7	Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements
		1.8	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2	**Commission electronics and communications system**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out commissioning work are followed
		2.2	Testing/measuring devices are connected and set up in accordance with job requirements for the communication system
		2.3	Measurements and adjustments are made to electronics and communications equipment to provide optimum system performance in accordance with system specifications and/or regulatory requirements
		2.4	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
		2.5	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes

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	2.6	System commissioning workplace procedures are performed in accordance with job requirements and industry standards
	2.7	Commissioning is carried out efficiently without unnecessary waste of materials or damage to electronic apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report commissioning activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Adjustment settings are documented in accordance with workplace procedures
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Commissioning results and work completion are communicated to appropriate person/s in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning electronics and communications systems must include at least the following:	• two different types of electronics and communications systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH167A Commission electronics and communications systems.

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Links

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Assessment Requirements for UEEEC0007 Commission electronics and communications systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and includes:

- identifying system design performance parameters and requirements
- measuring and adjusting system components to provide optimum system performance
- ensuring system operates within regulatory and/or specification requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic and communication systems commissioning
- commissioning processes:
  - purpose of commissioning
  - commissioning planning and documentation
  - procedures for commissioning systems encompassing:
    - configuring
    - calibrating
    - tuning
    - validating system performance to specification
    - procedures followed to commission instrument systems
  - purpose and importance of documentation
- project to be carried out in accordance with current WHS/OHS procedures
- relevant job safety assessments or risk mitigation processes

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- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to commissioning electronics and communications systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0008 Commission large fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to commission commercial fire protection systems.

It includes commissioning fire protection systems that include multiple connected detection, warning and fire control devices and remote monitoring. It also includes working safely, using fire protection industry standards and protocols, entering system instructions, testing functionality of fire protection components and system operation, and documentation of commissioning activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0041 Install fire detection and warning system apparatus

UEEEC0076 Verify compliance and functionality of fire protection system installations

UEEEC0026 Enter and verify programs for fire protection systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare fire protection system for commissioning	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards which have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
	1.4 Extent of commissioning is determined from reports, documentation and discussions with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the work site
	1.6 Tools, equipment and testing devices needed to commission fire protection system are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Commission fire protection system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out commissioning work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures

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	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fire protection system components are verified as complying with design specifications and regulations
	2.5	Fire protection devices are checked for correct location and alignment
	2.6	Fire protection functions are inspected and tested in accordance with industry standards commissioning requirements
	2.7	Sources of fire protection system anomalies are identified and corrected
	2.8	Decisions for dealing with unplanned situations are made from discussions with appropriate person/s and job specifications and requirements
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Commissioning activities are carried out efficiently without waste of materials or damage to fire apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report commissioning activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	'As-installed' fire protection system is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning fire alarms and warning systems must include at least the following:	• two different fire alarms and warning systems, including:
	  • one fire alarm system with at least 50 input devices, 20 output devices and two system interface controls
	  • one fire warning system with at least 50 speakers, five interface communication devices and two warning indicators
	  • voice message facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH164A Commission large fire protection systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0008 Commission large fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting ‘as-installed’ system correctly
- identifying and correcting function anomalies
- identifying the extent of the fire protection system
- inspecting and testing system functionality
- verifying compliance of components.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commissioning planning and documentation
- commissioning process for commercial fire protection system
- initial inspection, tests and adjustments requirements, including industry standards
- input devices, including conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections
- interface communication devices can be warden in communication phones and remote public address (PA) inputs
- output devices, including shutdown signal, door or system release controls and solenoid valve controls
- purpose of commissioning
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation

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processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures, including fire protection system commissioning procedures
- system interface controls, including communication signals to remote control and indicating equipment, building monitoring systems, paging system and colour graphics
- warning indicators, including flashing lights for hearing impaired persons and fire brigade building indication.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to commissioning commercial fire protection systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0009 Commission satellite and microwave communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and adjust satellite and microwave communication systems.

It includes setting up and adjusting of satellite and microwave communication systems for optimum performance. It also includes working safely, signal testing and analysis, adjusting equipment, following procedures and completing documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up satellite and microwave system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	measuring instruments	for a given work area are identified and applied
		1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for communication system work
		1.3 Safety hazards that have not previously been identified are noted on job safety assessments, risk assessed and risk control measures implemented
		1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
		1.5 Measurement parameters are identified by reviewing transmission/reception requirements and equipment manufacturer instructions
		1.6 Tools, equipment and testing devices needed for the communication system work are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.7 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with job requirements
		1.8 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
		1.9 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2	**Set up satellite and microwave communication system measuring instruments**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out satellite and microwave communication work are followed
		2.2 Testing/measuring instruments and devices are connected and set up in accordance with requirements for satellite and microwave communication system
		2.3 Measuring instruments are set up and adjusted in accordance with transmission/reception requirements and equipment manufacturer instructions
		2.4 Adjustments are made to provide optimum transmission/reception performance within regulatory

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		requirements
	2.5	Decisions for dealing with unplanned situations are made from discussions with appropriate person/s and job specifications and requirements
	2.6	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.7	Setting-up satellite and microwave communication system is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report set-up activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning satellite and microwave communication systems must include at least the following:	• two microwave/satellite communication systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH186A Commission satellite and microwave communication systems.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0009 Commission satellite and microwave communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying measurement parameters
- setting up and adjusting in accordance with communication systems requirements and equipment manufacturer's instructions
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying sustainable energy principles and practices
- commissioning microwave and satellite communications system
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) workplace procedures and practices, including the use of risk control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic communications, satellite and microwave, safe working practices and relevant standards, codes and regulations, including:
  - propagation of electromagnetic waves through the atmosphere, transmission lines and waveguides, including characteristic impedance, impedance matching, standing waves and microwave frequency bands
  - microwave device parameters involving wavelength, phase, voltage standing wave ratio (VSWR), impedance matching, circuit parameters, amplifiers, transmission, reception, oscillation, noise figure and noise temperature
  - microwave devices and components
  - microwave operational constraints and operating parameters such as power, bandwidth, gain, efficiency, operational life, electrical parameters, stability, cooling, size, testing and device selection
  - microwave measurements, test equipment and testing techniques

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- EMI/EMC, generation, suppression and reduction
- satellite communications systems encompassing:
  - types of satellite systems and sub-systems
  - earth station locality and antenna parameters
  - link specifications and link calculations
  - base band signalling processes
  - modulation and system access
- commissioning electronic communication systems encompassing:
  - purpose of commissioning
  - commissioning planning and documentation
  - initial tests and adjustments
  - commissioning procedures
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to commissioning microwave and satellite communication systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0010 Design and develop advanced digital systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and develop digital systems.

It includes designing and developing a digital system. It also includes working safely, following design brief, interpreting device/component specifications, constructing prototype devices, applying programming techniques to programmable devices, testing developed system prototype operation, verifying compliance of the design against the final brief, and documenting design and development work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design and develop digital system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures for a given design work area are identified and applied

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the design work
	1.3	Extent of the proposed digital system development is determined from the design brief or in consultation with appropriate person/s
	1.4	Design development work is planned to meet scheduled timelines in consultation with other person/s involved in the development work
	1.5	Materials and devices/components required for the development work are selected on compatibility of their specifications with digital system requirements and project budget constraints
	1.6	Tools, equipment and testing devices needed to carry out the development work are obtained and checked for correct operation and safety
2 Design and develop advanced digital system	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Digital devices and system and compliance industry standards are applied to the digital system design
	2.3	Alternative arrangements for the design are considered based on the requirements outlined in the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design
	2.5	Prototype devices and circuits are constructed and tested for compliance with the design brief, industry standards and regulatory requirements
	2.6	Prototype malfunctions are rectified and retested to ensure effective operation of design
	2.7	Digital system design is documented for submission to appropriate person/s for approval
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Obtain approval for the design	**3.1**	Design is presented and explained to client representative and/or relevant person/s

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3.2 Requests for modifications to the design are negotiated with relevant person/s within the constraints of workplace policy

3.3 Final design is documented and approval obtained from appropriate person/s

3.4 Quality of work is monitored against design brief performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and developing an advanced digital system must include at least the following:	• five variables • sequential functions • combinatorial functions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH148A Design and develop advanced digital systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0010 Design and develop advanced digital systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- constructing and testing prototype devices and circuits in accordance with design brief and regulatory requirements
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- verifying compliance of the design against the final brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- analogue to digital conversion
- connection of test/measuring devices into a circuit
- current types of oscillators based on their characteristics and operation
- current memory and storage devices based on their characteristics and operation
- design of complex sequential logic circuits (as a minimum three level sequential circuits), including current techniques - equation writing, reduction and propagation delay calculation
- design techniques for combinational and sequential logic circuits (as a minimum three levels and four input circuits)
- digital system design and development requirements

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- digital to analogue conversion
- programmable logic devices
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes and electronic safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing and developing advanced digital systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0011 Design and develop electronics/computer systems projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and develop an electronics/computer system project.

It includes working safely; and designing, constructing, recording, evaluating and reporting of an electronics/computer system design project.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify electronics/computer system project requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed,

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		control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of proposed project design/development work is determined from design brief in consultation with appropriate person/s
	1.4	Project work is planned to meet scheduled timelines in consultation with others involved on the worksite
	1.5	Resources required for work are selected based on compatibility with project requirements and budget constraints
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Design and develop electronics/computer system	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Electronics/computer devices and systems and industry standards are applied to the design specifications
	2.3	Alternative designs are considered based on the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design
	2.5	Electronic/computer hardware and/or software systems are constructed and tested for compliance with design brief and regulatory requirements
	2.6	Electronic/computer faults are rectified and retested to ensure effective operation of design
	2.7	Project design specifications are documented for submission to appropriate person/s for approval
	2.8	Solutions to unplanned situations are implemented in accordance with workplace policy
3 Obtain approval for electronics/computer system	**3.1**	Electronic/computer system design is presented and explained to client representative and/or relevant person/s
	3.2	Modifications to design are negotiated with relevant person/s within the constraints of workplace policy

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3.3 Final project design is documented and approval obtained from appropriate person/s

3.4 Quality of work is monitored against performance agreement and/or workplace or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and developing a medium-sized electronics/computer systems project includes designing, modifying, installing and applying the following:

- at least four digital and four analogue inputs and outputs (I/O), and at least one human-machine interface (HMI)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH188A Design and develop electronics - computer systems projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0011 Design and develop electronics/computer systems projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- constructing and testing prototype hardware and/or software according to design brief and regulatory requirements
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing outlines/plans of alternative designs
- developing the design within the safety and functional requirements and budget limitations/constraints
- documenting and presenting design effectively
- obtaining final design approval
- successfully negotiating design alteration requests
- verifying compliance of the design against the final brief
- identifying and preparing to design and develop electronic/computer system in accordance with design brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- connection of test/measuring devices into a circuit
- design objectives (specifications) to satisfy a customer attribute/brief
- design plan and solution synthesis (by selecting or creating the solution)
- electronic measuring instruments
- engineering design process

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- functional and non-functional requirements of a customer project
- relevant job safety assessments or risk mitigation processes, including:
  - risks and control measures associated with low voltage (LV) machines
- relevant industry standards, regulations, codes of practice and WHS/OHS legislated requirements
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures
- validations of the resulting design against the customer's needs.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing and developing electronics/computer systems projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0012 Design custom electronic equipment installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design custom electronic equipment installations.

It includes preparing to design custom electronic installations, and developing and obtaining approval for installation designs.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

UEEEC0077 Verify functionality and compliance of custom electronic installations

UEEEC0004 Assemble and set up fixed video/audio components and systems in buildings and premises

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to design custom electronic installations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Extent of the proposed custom electronic installation is determined from the design brief or in consultation with relevant person/s
	1.4 Design development work is planned in consultation with others to meet scheduled timelines
2 Develop installation design	**2.1** Principles of audio/video components, home theatre acoustics and regulations are applied to the design
	2.2 Installation design alternatives are considered based on the requirements outlined in the design brief
	2.3 Safety, functional and budgetary considerations are incorporated in the installation design
	2.4 Installation design draft is checked for compliance with the design brief and relevant industry standards
	2.5 Installation design is submitted to relevant person/s for approval
	2.6 Solutions to unplanned events are provided in accordance with workplace procedures
3 Obtain approval for installation design	**3.1** Installation design is presented and explained to client and/or relevant person/s
	3.2 Requests for design alterations are negotiated with relevant person/s in accordance with workplace procedures
	3.3 Final design is submitted for approval of relevant person/s
	3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing custom electronic equipment installations must include at least the following:	• two custom electronic installations, one of which must incorporate a dedicated home theatre

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH135A Design custom electronic equipment installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0012 Design custom electronic equipment installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- coordinating work with relevant person/s
- determining scope of design work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria range of conditions and include knowledge of:

- custom electronic equipment installation design, safe working practices and relevant standards, codes and regulations, including:
  - integrated audio systems:
    - types of audio control and switching devices
    - types of surround sound systems
    - operation of system control circuits, including the remote device
  - video and display set-up:
    - projectors encompassing:
      - aspect ratio
      - screen size

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        - orientation
        - throw distance, vertical elevation and horizontal orientation
    - direct view monitors adjustments
- audio/video control equipment:
    - types of control devices and their operating principles
    - control equipment arrangement in an audio/video system
- technical standards, regulations and codes for extra-low voltage (ELV) work:
    - limitation imposed by regulations
    - how to read and apply a standard
    - aspects of technical standards that apply to ELV work
- environmental and heritage awareness:
    - purpose of environmental and heritage regulation
    - typical issues affecting electrotechnology services and systems
    - meeting requirements
- acoustics, spatial treatment and sound reproduction:
    - effects of room dimensions, spatial shape and surface textures on acoustics
    - ideal acoustic for specific purposes - speech, solo or small group music, rock music, orchestral music, choral music and cinema
    - measuring room response
    - speaker placement and room response
    - room treatment methods to improve acoustic response
    - active methods to improve acoustic response
- equipment installation design:
    - requirements
    - limitations
    - procedures
    - documentation
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing custom electronic installations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0013 Design electronic printed circuit boards

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design electronic printed circuit boards.

It includes designing electronic printed circuit boards. It also includes developing alternative printed circuit board design schemes based on design brief and customer relations, and documenting designs.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design printed circuit board assembly	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and be applied
	1.2 Extent of the proposed circuit board and sub-assemblies design is determined from the design brief or in consultation with appropriate person/s

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	1.3	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved
2 Develop printed circuit board assembly design	**2.1**	Electronic components, sub-assemblies and industry standards are applied to the design
	2.2	Alternative arrangements for the printed circuit board design are considered based on the requirements outlined in the design brief
	2.3	Safety and functional considerations are incorporated in the printed circuit board design
	2.4	Printed circuit board design draft is checked for compliance with the design brief and design rules
	2.5	Printed circuit board design is documented for submission to appropriate person/s for approval
	2.6	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Provide assembly drawings and artwork files ready for production	**3.1**	Printed circuit board design is presented and explained to client representative and/or relevant person/s
	3.2	Requests for alterations to the printed circuit board design are negotiated with relevant person/s within the constraints of workplace policy
	3.3	Final printed circuit board design is documented and approval obtained from appropriate person/s
	3.4	Quality of work is monitored against performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing electronic printed circuit boards must include at least the following:

- two printed boards for different component population densities and related sub-assemblies, including:
  - single-sided printed circuit board
  - doubled-sided printed circuit board

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH181A Design electronic printed circuit boards.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0013 Design electronic printed circuit boards

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- creating a library of components
- creating custom component footprints and schematic elements using physical measurements and/or applicable datasheets
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- designing single and double-layer boards
- developing outlines of alternative designs
- developing the design within safety and functional requirements
- documenting and presenting design effectively
- extracting and checking manufacturing files/gerber and drill/excelon
- implementing common design rule parameters used by printed circuit board fabrication houses
- modifying existing component footprints and schematic elements using physical measurements and/or applicable datasheets
- running design rule and error checks within software package
- using a version control system (VCS) or implementing a version control strategy
- using an industry standard printed circuit board design software package
- using both surface mount device (SMD)/surface mount technology (SMT) and through-hole components
- using Vias in accordance with industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- design principles and industry standards
- design tools and software
- factors influencing design, including component placement, routing and auto-routing and design rules
- printed circuit board techniques, including materials and processes overview (photographic, mechanical, thermal and dielectric) and types of printed circuit board (single-sided, double-sided and multi-layer)
- relevant job safety assessments or risk mitigation processes
- relevant printed circuit board manufacturer specifications, including component specifications and their implications in a given circuit
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sources of components and technical data, including sources of components and technical data (data sheets and manufacturer's data) and circuit/apparatus parameters and specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing electronic printed circuit boards
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0014 Design signal-conditioning sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design signal-conditioning sub-systems incorporating digital and analogue elements.

It includes following design brief, applying knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, testing developed system prototype operation, and documenting design and development work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify design signal-conditioning sub-system requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed, control measures and workplace procedures are

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		implemented in preparation for work
	1.3	Scope of proposed signal-conditioning sub-system is determined from design brief in consultation with appropriate person/s
	1.4	Design signal-conditioning sub-systems development work is planned to meet scheduled timelines in consultation with person/s involved on the worksite
	1.5	Materials and devices/components required for work are determined on compatibility of their specifications with data acquisition system requirements and project budget constraints
2 Design signal-conditioning sub-system	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Digital and analogue device elements used in signal-conditioning sub-systems and relevant industry standards are applied to the design specification
	2.3	Alternative design/s are considered based on the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design specification
	2.5	Prototype devices and circuits are constructed, programmed and tested for compliance with design brief and regulatory requirements
	2.6	Prototype faults are rectified and retested to ensure effective operation of design
	2.7	Design specifications are documented for submission to appropriate person/s for approval
	2.8	Solutions to unplanned situations are implemented in accordance with workplace policy
3 Obtain design approval for signal-conditioning sub-system	**3.1**	Signal-conditioning sub-system design is presented and explained to client representative and/or relevant person/s
	3.2	Modifications to design are negotiated with relevant person/s within the constraints of workplace policy, as required
	3.3	Final sub-system design is documented and approval

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obtained from appropriate person/s

3.4 Quality of work is monitored against performance agreement and/or workplace or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH185A Design signal-conditioning subsystems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0014 Design signal-conditioning sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- constructing signal-conditioning sub-systems prototype
- dealing with unplanned situations in accordance with workplace procedures
- developing outlines of alternative designs
- developing the design within the safety and functional requirements, and budget constraints
- documenting and presenting design effectively
- negotiating design alteration requests
- planning to design signal-conditioning sub-systems
- reading and interpreting design brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- comparator circuits (open loop, limited swing and hysteresis) using operational amplifiers
- design brief specifications and work requirements
- differential amplifiers of suitable characteristics
- feedback control systems basics
- operational amplifier circuits
- principles of signal conditioning
- relevant industry standards, regulations, codes of practice and WHS/OHS legislated requirements
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures
- sensors and transducers.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing signal-conditioning sub-systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0015 Develop basic plans for integrating security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop plans for integrating security systems.

It includes integrating security components to form a complete security system with up to 100 connected intrusion and access devices based on common security scenarios. It also includes applying common security scenarios and security network industry standards and protocols, selecting network topology and physical media, applying disaster recovery planning, conducting performance management and documenting work activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

UEEEC0050 Program and commission commercial security systems

UEEEC0048 Program and commission commercial access control security systems

UEEEC0049 Program and commission commercial security closed-circuit television systems

UEEEC0052 Program and test large security systems

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop integrated security system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Extent of the proposed integrated security system is determined from the system specification or in consultation with appropriate person/s
	1.4 Development work is planned to meet scheduled timelines in consultation with other person/s involved on the worksite
2 Develop integrated security system plan	**2.1** Security scenarios and security network industry standards and protocols, network topology, physical media and disaster planning are applied to security system plan
	2.2 Alternative system arrangements are considered in accordance with job requirements and specifications
	2.3 Safety, functional and budget considerations are incorporated in the security system plan
	2.4 Security system draft plan is checked for compliance with job specifications and regulatory requirements
	2.5 Security system plan is documented for submission to appropriate person/s for approval
	2.6 Dealing with unplanned situations are discussed with appropriate persons in accordance with job specifications and requirements
3 Obtain approval for system plan	**3.1** Security system design is forwarded to client representative and/or relevant person/s for approval
	3.2 Requests for alterations to the security plan are negotiated with relevant person/s in accordance with workplace procedures

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3.3 Final security system plan is documented and approval obtained from appropriate person/s

3.4 Quality of work is monitored in accordance with performance agreement and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing basic plans for integrating security systems must include at least the following:	• two integrated security systems with up to 100 connected intrusion and access devices

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH157A Develop basic plans for integrating security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0015 Develop basic plans for integrating security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using of risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing outlines of alternative system plan
- developing the plan within safety and functional requirements and budget limitations
- documenting the security system plan effectively
- obtaining approval for final plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- alternative access arrangement
- integration with other systems
- intrusion protection and monitoring options
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant technologies
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, facilities, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing integrated security systems plans
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0016 Develop engineering solutions to RF amplifier problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions to resolve problems with radio frequency (RF) amplifiers.

It includes developing engineering solutions to resolve problems with RF amplifiers. It also includes working safely, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical RF amplifier electronic problems are those encountered in meeting performance requirements and compliance standards, revising a RF amplifier electronic operating parameter and dealing with RF amplifier electronic malfunctions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for RF amplifier electronic problems	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Extent of the RF amplifier problem is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with person/s involved in the work
	1.5 Effective strategies are formed to ensure solution development and implementation are carried out efficiently
2 Develop engineering solution for RF amplifier electronic problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 RF amplifier circuit device operation characteristics and applications are applied to developing engineering solutions to RF amplifier problems
	2.3 Parameters, specifications and performance requirements in relation to RF amplifier problems are obtained in accordance with workplace procedures
	2.4 Engineering approaches to resolving RF amplifier problems are analysed to provide most effective solutions
	2.5 Unplanned situations are responded to in accordance with regulatory requirements and workplace procedures in a manner that minimises risk to personnel and

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		equipment
	2.6	Quality of work is monitored against performance agreement and/or workplace procedures or industry standards
3 Test, document and implement engineering solution for RF amplifier electronic problems	**3.1**	Engineering solutions to RF amplifier problems are tested to determine their effectiveness and modified, as required
	3.2	Adopted engineering solution is documented, including instructions for implementation, that incorporates risk control measures to be followed
	3.3	Competent person/s required to implement solutions to RF amplifier problems is coordinated in accordance with regulatory requirements and workplace policies
	3.4	Justification for engineering solution used to solve RF amplifier problems is documented for inclusion in work/project development records in accordance with industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing solutions to RF amplifier problems must include at least the following:

- four RF amplifier electronic problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH182A Develop engineering solutions to RF amplifiers problems.

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Links

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Assessment Requirements for UEEEC0016 Develop engineering solutions to RF amplifier problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the radio frequency (RF) amplifiers electronic problems
- forming effective strategies for solution development and implementation
- obtaining RF amplifiers electronic parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to RF amplifiers electronic problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RF amplifiers problems, including:
  - RF amplifiers:
    - selection of RF components
    - frequency response of amplifiers
    - gain levelling techniques
    - tuned amplifiers
    - techniques for impedance matching capacitive and transformer coupling
    - double-tuned circuits
    - tapped C and L circuits for Z-matching (use of S parameters and Smith charts)

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    - small signal RF amplifiers
    - RF power amplifiers class A,B,C,D - low power (1W)/high power (kWs) - typical circuits
    - power combiners
    - strip line circuit techniques
- transmission lines and antennas:
    - reflectometry minimum and maximum voltage and current values on a transmission line carrying an RF signal
    - transmission line loss measured in decibels
    - EH field directions in relation to antenna elements
    - WHS/OHS standards, codes and regulations of Australian Communications and Media Authority (ACMA) for power, frequency and antenna gain
- engineering principles
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing solutions to RF amplifiers problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEEEC0017 Develop engineering solutions to analogue electronic problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions to analogue electronic problems.

It includes preparing to develop engineering solutions for analogue electronic problems; developing engineering solutions for analogue electronic problems; testing, reporting on and implementing engineering solution for analogue electronic problems.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0067 Troubleshoot basic amplifier circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solutions for analogue electronic	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and

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problems		applied
	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Extent of the analogue electronic problem is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with relevant person/s
	1.5	Effective strategies are identified to ensure solution development and implementation is conducted efficiently
2 Develop engineering solution for analogue electronic problems	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Principles of analogue electronics circuit device operation characteristics and applications are applied to developing solutions to analogue electronic problems
	2.3	Parameters, specifications and performance requirements related to each analogue electronic problem are obtained in accordance with workplace procedures
	2.4	Approaches to resolving analogue electronic problems are analysed to determine most effective solutions
	2.5	Unplanned events are dealt with safely and effectively in compliance with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against relevant performance measures and/or established organisational or professional standards
3 Test, report on and implement engineering solution for analogue electronic problems	**3.1**	Solutions to analogue electronic problems are tested to determine their effectiveness and modified where necessary
	3.2	Adopted solutions are recorded in the required format, including implementation instructions and risk controls
	3.3	Relevant qualified person/s required to implement solutions to analogue electronic problems are

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coordinated in accordance with regulatory requirements and workplace procedures

3.4 Justification for solutions used to solve analogue electronic problems is recorded for inclusion in work/project development records in accordance with professional standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions for analogue electronic problems must include at least the following:

- two analogue electronic problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH145A Develop engineering solutions to analogue electronic problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0017 Develop engineering solutions to analogue electronic problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining the extent of the analogue electronic problem
- identifying effective strategies for solution development and implementation
- obtaining analogue electronic parameters, specifications and performance requirements appropriate to each problem
- recording implementation instructions for solutions, including risk controls
- reporting justification for solutions implemented in accordance with professional standards
- testing solutions to analogue electronic problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- active filters
- advanced power amplifiers
- amplifiers with given piecewise linear transfer characteristics
- classes of power amplifiers and typical maximum efficiencies for each class
- comparator circuits (open loop, limited swing and hysteresis) using operational amplifiers
- differential amplifiers using discrete components (transistors) to meet system objective
- operation and building of precision half-wave and full-wave rectifiers
- operation of each class and type of power amplifier circuit
- operational amplifier circuits
- oscillators

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- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant standards, codes and regulations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- single-stage analogue electronics.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing solutions to analogue electronic problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0018 Develop engineering solutions to audio electronic problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions to audio electronic problems.

It includes developing engineering solutions to resolve problems with audio electronics. It also includes working safely, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical audio electronic problems are those encountered in meeting performance requirements and compliance standards, revising audio electronic operating parameters and dealing with audio electronic malfunctions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0067 Troubleshoot basic amplifier circuits

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify audio electronic problems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Extent of the audio electronic problem is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the electronic work
	1.5 Effective strategies are formed to ensure solution development and implementation are in accordance with workplace procedures
2 Develop engineering solution for audio electronic problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the electronic work are followed
	2.2 Audio electronics circuit device/component operation, characteristics and their application are applied to resolve audio electronic problem
	2.3 Parameters, specifications and performance requirements in relation to each audio electronic problem are obtained in accordance with workplace procedures
	2.4 Approaches to resolving audio electronic problems are analysed to provide most effective solutions
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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	2.6	Quality of work is monitored against performance agreement and/or workplace procedures or professional industry standards
3 Test, document and implement engineering solution for audio electronic problems	**3.1**	Solutions to audio electronic problems are tested to determine their effectiveness and modified, as required
	3.2	Adopted solutions are documented and include instructions for their implementation that incorporates risk control measures to be followed
	3.3	Appropriately competent and qualified person/s required to implement solutions to audio electronic problems are coordinated in accordance with regulatory requirements and workplace policies
	3.4	Justification for solutions used to solve audio electronic problems is documented for inclusion in work/project development records in accordance with professional standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions to audio electronic problems must include the following:	• at least four audio electronic problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH149A Develop engineering solutions to audio electronic problems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0018 Develop engineering solutions to audio electronic problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the audio electronic problem
- forming effective strategies for solution development and implementation
- obtaining audio electronic parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to audio electronic problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- audio electronics engineering solutions, safe working practices and relevant standards, codes and regulations, including:
    - acoustics, spatial treatment and sound reproduction:
        - effects of room dimensions, spatial shape and surface textures on acoustics
        - ideal acoustic for specific purposes - speech, solo or small group music, rock music, orchestral music, choral music and cinema
        - measuring room response
        - speaker placement and room response
        - room treatment methods to improve acoustic response

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    - active methods to improve acoustic response
- audio reproduction and electronic components:
    - preamplifiers amplifier encompassing:
        - function in the reproduction chain
        - typical circuit arrangements
    - power and integrated amplifiers encompassing:
        - function in the reproduction chain
        - typical circuit arrangements
    - graphic equalizers encompassing:
        - function in the reproduction chain
        - typical circuit arrangements
    - component interconnections
- advanced electronic testing and measuring devices and techniques:
    - test/measuring devices and their application - frequency counters, and synthesisers, spectrum analysers, noise and distortion meters and radio frequency (RF) communications service monitor
    - connection of test/measuring devices into a circuit encompassing:
        - safety procedures
        - loading and matching
        - storage and delay
        - circuit arrangement of test/measuring devices
    - taking and interpreting readings
    - notion of decibels, including dBm, dBr, dBu and dBo
- audio system advanced diagnostic techniques:
    - perception and measurement of sound
    - acoustics and equalisation
    - sound recording and reproduction technologies
- audio component testing, measurements and adjustments - frequency response for given loads, small signal test, distortion measurement, noise measurement, frequency versus distortion, intermodulation spectrum, spectral-decay plots, acoustic cross-over, anechoic response, lateral and vertical response
- engineering principles
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing solutions to audio electronic problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0019 Develop software solutions for microcontroller-based systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop software solutions for microcontroller-based systems.

It includes preparing to develop code, developing code, testing and documenting the development of code.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop code	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Extent of code development is determined from job

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		performance specifications and in consultation with relevant person/s
	1.3	Activities are planned to meet scheduled timelines in consultation with relevant person/s in accordance with workplace procedures
	1.4	Development kit and software are selected based on specified requirements and performance standard
	1.5	Strategies are implemented to ensure programming is carried out efficiently
2 Develop code	**2.1**	Correct syntax is applied when developing code
	2.2	Key features of the programming language used are applied to develop and test solutions
	2.3	Approaches to issues/problems are analysed to determine effective solution/s
	2.4	Quality of work is monitored against relevant performance measures in accordance with workplace procedures and relevant industry standards
3 Test and document the development of code	**3.1**	Testing procedures are developed to analyse code
	3.2	Problems and bugs in code are rectified to ensure specifications are met
	3.3	Reports are prepared in accordance with professional standards and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing software solutions in	• modifying an existing microcontroller program to comply with specified operating

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microcontrollers/microprocessors must include at least the following:	parameters • developing microcontroller software to comply with a specified function and operating parameters • debugging code
Configuring and using at least one of the internal peripherals present on the device of the following:	• analogue to digital converter (ADC) • digital to analogue converter (DAC) • external interrupt • pulse width modulation (PWM) • serial communications ports

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH115A Develop software solutions for microcontroller based systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0019 Develop software solutions for microcontroller-based systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- configuring the microcontroller to use the input/output (I/O) ports for reading digital inputs and writing to digital outputs
- configuring microcontroller timers
- configuring timers to provide different microcontroller functions
- coordinating work with relevant person/s
- implementing a program for a specific task
- implementing code to perform specific tasks.
- providing justification for solutions to problems
- providing solutions to microcontroller software problems
- uploading code to a microcontroller using the correct set-up for the architecture and using appropriate programming hardware
- using a microcontroller and attached relevant components to test and debug code
- using industry standard integrated development environment (IDE) to develop code
- using methodical problem-solving methods
- using the inbuilt functions of an IDE to simulate the functions and registers of a microcontroller in order test and debug code.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- software programming fundamentals, including:
  - addressing modes
  - arithmetic and logic instructions
  - I/O ports
  - microprocessor/microcontroller architecture
  - relevant standards, codes and regulations
  - sub-routines
  - timing loops.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing software solutions in microcontroller-based systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0020 Develop solutions for air surveillance apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions for air surveillance apparatus and systems in compliance with relevant regulatory requirements of the Civil Aviation Safety Authority (CASA) and national operating standards.

It includes working safely, interpreting diagrams, applying logical engineering solution methods of air surveillance apparatus and systems, conducting safety inspections and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0068 Troubleshoot communication systems

UEEEC0053 Provide engineering solutions to air traffic control system problems

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Identify air surveillance apparatus and system problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Operational safety workplace procedures for air surveillance work areas are obtained and applied
	1.3 WHS/OHS risk control measures and workplace procedures are followed in preparation for work activities
	1.4 Safety hazards that have not previously been identified are documented on job safety assessments, risks assessed and control measures devised and implemented in consultation with appropriate person/s
	1.5 Extent of air surveillance apparatus problems is determined from reports, diagrams, relevant documentation and discussions with appropriate person/s
	1.6 Appropriate person/s is consulted to ensure the work activity is coordinated effectively with others
	1.7 Tools, equipment, inspection and testing devices needed to provide engineering diagnosis are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Provide air surveillance apparatus and systems engineering solution	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work activities are followed
	2.2 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
	2.3 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods are applied to provide engineering solutions to problems in air surveillance apparatus and systems using measurements and estimations of system operating parameters with reference to system operational requirements

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	2.5	Suspected air surveillance problem scenarios are tested to determine the source of system problems
	2.6	Source of the fault is identified and an appropriately competent person/s engaged to rectify the fault in accordance with workplace procedures
	2.7	Problems in the electronic components of the system are rectified in accordance with air surveillance and observation system operation standards
	2.8	Air surveillance system is inspected and tested to verify that the system operates as intended and to specified requirements
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements
	2.11	Rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report air surveillance apparatus and system engineering solution activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Engineering solutions for air surveillance apparatus and systems are documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified in accordance with workplace procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying engineering solutions in air surveillance and observation systems must include at least the following:	• two engineering solutions in two of the following:
	  • primary surveillance radar (PSR)
	  • secondary surveillance radar (SSR)
	  • mode S SSR
	  • radar track processors
	  • radar remote control monitoring system (RCMS)
	  • air defence system (ADS)
	  • multilateration (MLAT)
	  • surveillance track messages
	  • airborne collision avoidance system (ACAS)/traffic alert and collision avoidance system (TCAS)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH192A Develop solutions for air surveillance apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0020 Develop solutions for air surveillance apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using test equipment to test the apparatus and system
- identifying problems and competency needed to provide solutions
- implementation of solutions
- verifying that the system operates correctly
- documenting engineering solutions
- dealing with unplanned events
- applying sustainable energy principles and practices
- creating test scenarios in developing engineering solutions for air surveillance apparatus and systems
- performing radar spectrum check
- providing solutions in air surveillance apparatus and systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic communications air surveillance systems, including:
  - basic radar principles encompassing:
    - requirement of surveillance to support efficient, safe and effective air traffic control (ATC) operations
    - aircraft aspects
    - basic radar history
    - electromagnetic waves
    - radiation hazards and work health and safety (WHS)/occupational health and safety (OHS) considerations

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  - radar principles of operation
  - types of radar and radar block diagram
  - main inputs and outputs for designated blocks of a given diagram
  - requirement for redundancy
  - go/no-go concept
  - radar performance limitations
  - different types of radar self- testing
  - surveillance- original environment and developing environment
  - surveillance users
  - radar locations and radar coverage map
- principles of operation of a primary surveillance radar (PSR) encompassing:
  - purpose of a PSR
  - principles of radar blind speed and measures to overcome this
  - why radars use pulse compression and the types of modulation used
  - diversity operation is used in Primary radars
  - radiation pattern for a ‘cosec2’ and slotted waveguide antenna
  - radars use high / low coverage
  - features of primary radars currently in service
- principles of operation of a classical secondary surveillance radar (SSR) encompassing:
  - similarities and differences between PSR and SSR
  - requirement to use wobbulation
  - relevant International Civil Aviation Organisation (ICAO) (Annex 10) specifications
  - modes of operation
  - transponder special replies and their functions
  - SSR radiation patterns
  - reasons for "No Reply" from an aircraft
  - definition of garbling
  - definition of false replies unsynchronised in time (FRUIT)
  - function of a site monitor
  - advantages and disadvantages of SSR over primary radar
  - features of classical SSRs
- principles of operation of a mode S SSR encompassing:
  - improvements mode S has over classical SSR
  - ICAO requirements relating to the use of aircraft addresses and interrogator codes
  - purposes of all-call and roll-call interrogations
  - principles of acquiring aircraft
  - users of mode S transponders quitter
  - protocols used to reduce FRUIT
  - principles of all-call lockouts and lockout overrides

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    - requirement for classical SSR and mode S SSR compatibility
    - benefits to a controller of using elementary and enhanced surveillance
    - features of mode S SSRs
- principles of operation of radar track processors encompassing:
    - function of radar track processor currently in service
- principles of operation of radar remote control monitoring system (RCMS):
    - requirement for RCMS
    - RCMS network layouts
- principles of operation of air defence system (ADS) encompassing:
    - principles of operation of ADS-B
    - aircraft data transmitted by ADS-B
    - aircraft ADS-B transmission rates
    - principles of operation of ADS-C
- principles of operation of multilateration (MLAT) encompassing:
    - introduction, definition and history of MLAT
    - TDOA concepts
    - airport/local area concept
    - airborne/wide area concept
    - data and identification
    - surveillance strategies
    - MLAT coverage
    - principles of operation of MLAT
    - message formats used by MLAT systems
    - similarities and differences between MLAT and ADS-B systems
- principles of surveillance track messages encompassing:
    - requirement for duplicated data paths
    - ATS centre processing and displaying of surveillance tracks
    - contents of data messages sent from radar sites
    - contents of data messages sent from ADS-B radar sites
- principles of airborne collision avoidance system (ACAS)/traffic alert and collision avoidance system (TCAS) encompassing:
    - purpose and types of ACAS/TCAS
    - function of ACAS/TCAS
    - how ACAS/TCAS acquires and tracks aircraft
    - ICAO requirements with respect to complying with RAs
- performance characteristics and checks encompassing:
    - measurement of radar performance
    - measurement of radar pulse shape/timing check
    - measurement of radar transmitter frequency
    - performing radar spectrum check

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    - identification of radar performance with or outside documented performance limits
- relevant apparatus manufacturer specifications
- relevant Civil Aviation Safety Authority (CASA) national operating standards, and workplace policies and procedures
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to providing engineering solutions for air surveillance apparatus and systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0021 Diagnose and rectify faults in air navigation circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in aviation navigation circuits and systems in compliance with relevant regulatory requirements of the Civil Aviation Safety Authority (CASA) and national operating standards.

It includes diagnosing aviation navigation circuits and system faults, interpreting circuit diagrams, rectifying faults, conducting safety inspections and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0061 Set up and adjust commercial radio frequency (RF) transmission and reception systems

UEEEC0068 Troubleshoot communication systems

UEEEC0053 Provide engineering solutions to air traffic control system problems

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to diagnose aviation navigation circuits and system faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Aviation operational safety procedures for a given work area are obtained and applied
	1.3 WHS/OHS risk control measures and workplace procedures are followed in preparation for aviation work activity
	1.4 Safety hazards that have not previously been identified are documented on job safety assessments, risks assessed and control measures implemented in consultation with appropriate person/s
	1.5 Extent of faults is determined from reports, circuit diagrams and other relevant documentation, and discussions with appropriate person/s
	1.6 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the work site
	1.7 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify aviation navigation system faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work activities are followed
	2.2 Need to inspect, test or measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3 Circuits, machines and plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods are applied to diagnose aviation navigation system faults, employing measurements and estimations of system operating parameters in accordance with system operational requirements

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	2.5	Suspected fault scenarios are tested as being the source of navigation system problems
	2.6	Source of the fault is identified and competent person/s engaged to rectify the fault in accordance with workplace procedures
	2.7	Faults in the electronic components of the system are rectified in accordance with navigation system operation standards
	2.8	Aviation navigation system is inspected and tested to verify the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are made from discussions with appropriate person/s and job specifications and requirements
	2.10	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Commission aviation navigation system	**3.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	3.2	Testing and measuring devices are connected and set up in accordance with job requirements and the particular air navigational system
	3.3	Measuring instruments are set up and adjusted in accordance with transmission/reception requirements and equipment manufacturer instructions
	3.4	Adjustments are made to provide optimum transmission/reception performance within regulatory requirements
	3.5	Decisions for dealing with unplanned situations are made from discussions with appropriate person/s and job specifications and requirements
	3.6	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises

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		risk to personnel and equipment
	3.7	Setting up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
4 Complete and report fault diagnosis and rectification activities	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Worksite is made safe in accordance with workplace safety procedures
	4.3	Rectification of faults is documented in accordance with workplace procedures
	4.4	Appropriate person/s is notified in accordance with workplace procedures that the aviation navigation system faults have been rectified and recommission

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying system faults in electronic air navigation systems must include at least the following:	• four system faults in four of the following systems:
	  • non-directional beacon (NDB)
	  • very high frequency (VHF) omni directional radio range (VOR)
	  • distance measuring equipment (DME)
	  • instrument landing system (ILS)
	  • global navigation satellite system (GNSS)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH191A Diagnose and rectify faults in air

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navigation circuits and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0021 Diagnose and rectify faults in air navigation circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying sustainable energy principles and practices
- commissioning of air navigational system
- completing and reporting fault diagnosis and rectification activities
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic communications - air navigation systems, including:
  - aviation navigation services and principles encompassing:
    - role of navigation aids in providing air traffic control (ATC) services
    - functions provided by navigational aids
    - Rho Theta concept in context of navigational aids used within aviation
    - relevant International Civil Aviation Organisation (ICAO) (Annex 10) specifications
    - monitoring – equipment, status and pilot
  - principle of operation of the non-directional beacon (NDB) encompassing:

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  - simple block diagram of an NDB
  - frequency band of operation
  - parameters ICAO requires to be monitored
  - typical radiation hazard issues
  - simple block diagram of the aircraft automatic direction finding (ADF) display
  - NDB used by pilots and ATC
- principle of operation of the CVOR/DVOR encompassing:
  - simple block diagram of a CVOR labelling each part
  - basic principles of variable and reference information
  - radio frequency (RF) phasing and far field space modulation
  - frequency band of operation
  - features of a typical aircraft display
  - possible errors and their cause in a CVOR
  - typical CVOR and DVOR facilities
  - main differences of operation between CVOR and DVOR
- principle of operation of the distance measuring equipment (DME) encompassing:
  - simple block diagram of a DME
  - typical timing diagram from interrogation to reply
  - features of aircraft display system
  - frequency band of operation
  - modes of operation
- principle of operation of the instrument landing system (ILS):
  - frequency band of operation
  - simple diagram of the localiser antenna pattern marking on it the zero DDM line, the represented colour and modulating frequency of each lobe and the clearance signal
  - simple sketch showing the glide path and the location of the marker beacons listing their identification, frequency and duration
  - simple block diagram to show the generation of the carrier and sidebands and sideband only signals
  - ILS antenna arrays and far field radiation patterns
  - far field phasing and space modulation
  - terms DDM and SDM
  - performance requirements for CAT I, CAT II and CAT III ILS
- principle of global navigation satellite system (GNSS):
  - basic principles of the wide area differential global positioning system (WADGPS)
  - basic principles of the local area differential global positioning system (LADGPS)
- NDB technology and maintenance:
  - key functional modules of a contemporary NDB transmitter
  - function of the aerial coupling unit
  - radiation hazard issues, site restrictions and safety considerations in context of an

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NDB facility
  - signals in and out of the main components
  - key features and theory of operation of an NDB antenna (field pattern, capacity hat and ground plane)
  - hardware configurations of current models of NDB used in the National Airways System of Australia
  - indicators on NDB equipment that may be used to determine status and locate a fault
  - method(s) for conducting routine performance measurements on NDB equipment
  - process for removing an NDB from service
  - correct test equipment based on measurement tolerance and parameter being measured
  - correct use of selected test equipment
  - process for returning the aid to service
  - locate and identify appropriate NDB documentation (AEIs)
  - mandated flight check of an NDB
- DME technology and maintenance:
  - key functional modules of a contemporary DME beacon
  - modes of operation and relevant channel spacing for the interrogation and reply of the beacon
  - purpose of the "squitter"
  - typical DME block diagram, the signal flow through the beacon from incoming interrogation to outgoing reply
  - function of each module in a contemporary DME
  - term "Gaussian shaped pulse" and why it is used
  - operation and purpose of the identification signal including test transmissions
  - definition of "dead time"
  - monitored parameters of a DME
  - controls and indicators
  - correct ON/OFF sequence
  - process for removing a DME from service
  - auto-recycle operation
  - typical function of the CTU for testing
  - typical alarm registers
  - measurement of parameters such as beacon delay, pulse spacing, pulse width, Ident, beacon sensitivity, selectivity, reply rate, dead time, frequency, monitor limits, antenna VSWR and using the correct test equipment
  - correct use of test equipment
  - correlate the measurements to the standard operating conditions (SOC)
  - maintenance actions that may be performed without the requirements of a flight inspection
  - flight calibration check of an DME
  - process for returning the aid to service

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    - location and identification of appropriate DME documentation (AEIs)
- CVOR technology and maintenance:
    - principles of operation of a VOR and how the component signals are generated in a contemporary CVOR beacon
    - basic operation and functionality of the transmitter, goniometer, modulation eliminator, monitor and antenna
    - typical monitored parameters for a CVOR
    - purpose of monitor bypass
    - correct use of test equipment and interpretation of results
    - measurement of performance parameters using the correct test equipment
    - correct use of test equipment
    - correlate the measurements to the SOC
    - maintenance actions that may be performed without the requirements of a flight inspection
    - maintenance actions that do require a flight inspection
    - importance of beacon accuracy
- DVOR technology and maintenance:
    - principles of operation of a DVOR and how the component signals are generated in a contemporary DVOR beacon
    - basic operation and functionality of the modules used in the following sub-systems: carrier generation and modulation, timing sequence generation, sideband amplifier and modulator, sideband antenna commutation, monitor and controller
    - front panel indications under normal and fault conditions
    - operation and functionality of the following circuits: carrier amplifier and modulation (CGD, CPA, CDC and CMP), timing signals generation (TSD), reference phase generator (RPG), antenna switching (ASD and ADS), sideband generator (SGN, SMA and SCU), control unit (CTU), monitor unit (MRF, MSC, MFI, MBD and MSD)
    - typical monitored parameters for a DVOR
    - correct use of test equipment and interpretation of results
    - measurement of performance parameters using the correct test equipment
    - correct use of test equipment
    - correlate the measurements to the SOC
    - maintenance actions that may be performed without the requirements of a flight inspection
    - maintenance actions that do require a flight inspection
    - importance of beacon accuracy
- ILS technology and maintenance:
    - ILS functional blocks and typical cabinet modules of a localiser and glide path (NM7000 series)
    - main functional elements of a contemporary marker beacon
    - location and function of modules and system interconnections: transmitter, changeover, monitor, transmitter controller, remote control, RMS/RMM and power

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    - block diagram illustration at specified points, the signal flow out from the distribution side and/or return via the recombination side of a localiser and/or glide path
    - operation of a specified localiser antenna array
    - operation of an ‘M’-array or other specified glide path antenna array
    - the features and function of the RMM and/or RMS
    - performance requirements for CAT I, CAT II and CAT III ILS and how these are provisioned in the system hardware and monitoring
    - function of equipment indicators and controls, including the correct operation of controls to achieve a nominated function
    - typical monitored parameters for a localiser, glide path and marker beacon
    - correct use of test equipment (BITE and external) and interpretation of results
    - measurement of performance parameters using the correct test equipment
    - correct use of test equipment
    - correlate the measurements to the SOC
    - maintenance actions that may be performed without the requirements of a flight inspection
    - maintenance actions that do require a flight inspection
    - typical tests and maintenance actions required during a flight calibration of an ILS
- relevant Civil Aviation Safety Authority (CASA) national operating standards, workplace policies and procedures
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS and CASA legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults

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in air navigation systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0022 Diagnose and rectify faults in camera circuits and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in camera circuits and equipment.

It includes fault finding and repairing faults in camera circuits and equipment. It also includes working safely, applying logical diagnostic methods of camera circuit components, rectifying faults, safety and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0029 Fault find and repair electronic apparatus

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and	**1.1** Work health and safety (WHS)/occupational health and

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	rectify camera circuits and equipment faults		safety (OHS) requirements and workplace procedures for a given work area are identified and applied
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for camera circuits and equipment work
		1.3	Safety hazards that have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
		1.4	Extent of faults is determined from reports, documentation and discussions with appropriate person/s
		1.5	Appropriate person/s is consulted to ensure the camera circuits and equipment work is coordinated effectively with others involved on the worksite
		1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Diagnose and rectify camera circuits and equipment faults**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out camera circuits and equipment work are followed
		2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted within workplace safety procedures
		2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Logical diagnostic methods are applied to diagnose camera circuit faults using measurements of circuit operating parameters in accordance with camera operating specifications
		2.5	Suspected fault scenarios are tested as being the source of camera circuit problems
		2.6	Faults in the electronic components of the camera circuits are rectified to camera circuits operation and industry standards
		2.7	Circuits are inspected and tested to verify that the

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		camera operates to specified requirements
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and consistent with job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified in accordance with workplace procedures that camera circuit faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in camera circuits and equipment must include at least the following:	• two circuit faults in two different types of cameras

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH178A Diagnose and rectify faults in camera

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circuits and equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0022 Diagnose and rectify faults in camera circuits and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of circuit faults
- identifying the cause faults using logical diagnostic methods
- rectifying faults effectively
- verifying that the camera operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- camera circuits and equipment diagnostics safe working practices and relevant standards, codes and regulations, including:
  - operation of camera circuits
  - recording media, standards and formats
  - pick-up tubes and charge coupled devices
  - operation of optical transducers and lenses
  - colour separation techniques and signal processing
  - charge coupled devices
  - mechanics and adjustments
  - power supplies and batteries
  - MPEG capability

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- camera circuit diagnosis encompassing:
  - sub-system components (i.e. functional blocks) and their operating parameters
  - environment factors effecting system performance
  - typical faults, their symptoms and cause
  - fault diagnosis procedures and testing
  - sub-system adjustments
- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS effectiveness
  - assess resources to establish and maintain WHS/OHS systems
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in camera circuits
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0023 Diagnose and rectify faults in digital transmission circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in digital transmission circuits and systems.

It includes fault finding and repair of faults in digital transmission systems. It also includes working safely, applying logical diagnostic methods of digital transmission systems circuit components, rectifying faults, safety and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0024 Diagnose and rectify faults in electronic display circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify digital	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	transmission circuits and system faults		for a given work area are obtained and applied
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for digital transmission circuits and system work
		1.3	Safety hazards which have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
		1.4	Extent of faults is determined from reports, documentation and discussions with appropriate person/s
		1.5	Appropriate person/s is consulted to ensure digital transmission circuits and system work is coordinated effectively with others involved on the worksite
		1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Diagnose and rectify digital transmission circuits and system faults**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out digital transmission circuits and system work are followed
		2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
		2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Logical diagnostic methods are applied to diagnose digital transmission apparatus faults using measurements of circuit operating parameters in accordance with apparatus operating specifications
		2.5	Suspected fault scenarios are tested as being the source of digital transmission circuit system problem
		2.6	Faults in the electronic components of the digital transmission apparatus are rectified to circuit and system operation standard

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	2.7	Circuits are inspected and tested to verify that digital transmission circuit apparatus operates as intended and to specified requirements
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and consistent with job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of digital transmission circuit and system faults is documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified in accordance with workplace procedures that apparatus faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in digital transmission circuits and systems must include at least the following:	• two circuit faults in two different types of digital transmission systems

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH180A Diagnose and rectify faults in digital transmission circuits and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0023 Diagnose and rectify faults in digital transmission circuits and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of circuit faults
- identifying the cause faults using logical diagnostic methods
- rectifying faults effectively
- verifying that the apparatus operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- digital television transmission faults, advanced digital television principles, digital television transmission towers and equipment, applying safe working practices and relevant standards, codes and regulations, including:
  - audio component encompassing:
    - audio encoding
    - audio masking
    - audio sub-band encoding
  - Dolby AC-3
  - MPEG-2 system layer encompassing:
    - PES packet construction
    - time stamps

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    - programme clock reference (PCR)
    - transport packet header
    - programme specific information (PSI)
- channel encoding:
    - forward error correction (FEC)
    - bit error rate (BER)
    - puncturing
- interleaving
- modulation:
    - phase shift keying (PSK)
    - quadrature amplitude modulation (QAM)
    - orthogonal frequency division multiplexing (OFDM)
    - coded orthogonal frequency division multiplexing (COFDM)
- hierarchical modulation:
    - terrestrial channel encoder
    - satellite channel encoder
    - carrier to noise ratio (C/N)
- single frequency networks:
    - guard interval
    - mega-frames
- the requirements of digital television terrestrial broadcast (DTTB) program input and monitoring equipment encompassing:
    - basic system arrangement: a central router connected to a number of control rooms
    - terminologies: vertical, multi-level; tie-line routing and cross point
    - typical signal types processed by a router
    - the purpose of redundant central processing units (CPUs) and power supply units
    - common control protocols used in routers
    - typical analogue audio and video output voltage levels present at the router
    - typical specifications for digital data signals present at the router
    - function of various test equipment used in DTTB measurements
- the operating characteristics of a DTTB transmitter encompassing:
    - typical DTTB digital transmission system
    - safety precautions required when working with high power radio frequency (RF) transmitters
    - operating characteristics of a typical MPEG encoder
    - operation of a COFDM modulator
    - arrangement of sub-system components in a DTTB transmitter
    - purpose of an up converter in a DTTB transmitter
    - typical characteristics of a DTTB power amplifier
    - advantages and disadvantages of air and liquid cooling systems used in transmitters

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    - typical DTTB transmitter measurements techniques
- the performance requirements of the DTTB combiner and antenna systems encompassing:
    - minimum channel separation required between digital and analogue television channels
    - typical specifications of an antenna combiner system
    - the need for combiner systems in DTTB systems
    - typical system faults in combiners and antenna system
- the requirements of remote monitoring and measurement equipment encompassing:
    - purpose of control panel indicators and controls
    - process by which the system manages a critical failure: power supplies and CPUs
    - different system alarm signals
    - periodic equipment self-tests and diagnostic routines on DTTB systems
    - DTTB systems fault diagnostic and rectification techniques
    - function of the basic components of a DTTB system
    - typical units of a DTTB telemetry system
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in digital transmission systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0024 Diagnose and rectify faults in electronic display circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in electronic display circuits.

It includes fault finding and repair of faults in cathode ray tubes, liquid crystal and plasma display circuits. It also includes working safely, applying logical diagnostic methods and rectifying faults, safety and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0070 Troubleshoot faults in television receivers

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify electronic display	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	circuit faults		for a given work area are identified and applied
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
		1.3	Safety hazards which have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
		1.4	Extent of faults is determined from reports, documentation and discussions with appropriate person/s
		1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
		1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Diagnose and rectify electronic display circuit faults**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out electronic display circuit work are followed
		2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
		2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Logical diagnostic methods are applied to diagnose display circuits faults, employing measurements of circuit operating parameters referenced to display operating specifications
		2.5	Suspected fault scenarios are tested as being the source of display circuit problems
		2.6	Faults in the electronic components of the display circuits are rectified to display circuits operation and industry standards
		2.7	Circuits are tested to verify that the display operates as intended in accordance with industry standards and to

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		specified requirements
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and consistent with job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified in accordance with workplace procedures that display circuit faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in electronic display circuits must include at least the following:	• two circuit faults in two different types of displays

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH176A Diagnose and rectify faults in electronic

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display circuits.

Links

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Assessment Requirements for UEEEC0024 Diagnose and rectify faults in electronic display circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of circuit faults
- identifying the cause faults using logical diagnostic methods
- rectifying faults effectively
- verifying that the display operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- connecting test/measuring devices into a circuit in accordance with industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic displays faults, applying safe working practices and relevant standards, codes and regulations, including:
  - cathode ray tube displays encompassing:
    - operation and characteristics of various types of cathode-ray tubes, including delta, in-line and precision in-line
    - voltages, statics and x-rays around cathode ray tubes
    - set-up and adjustment techniques
    - rear and front projection television systems
    - typical faults
  - plasma displays and their circuit control operation encompassing:
    - advantages of flat panel displays (over conventional cathode ray tubes and raster

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geometry)
    - theory of plasma gas discharge and phosphor excitation
    - scanning techniques (column/row addressing)
    - luminance/colour aspects (the need to re-address pixels to control light output)
    - gamma correction considerations (reversal of the gamma correction that is carried out at the television studio to compensate for the non-linearity of light output of a conventional cathode ray tube
    - plasma flat panel construction (and handling)
- liquid crystal displays and the control circuit operation encompassing:
    - principles of transmissive liquid-crystal display (LCD) (as opposed to reflective types)
    - light polarisation (polarisation twisting characteristics of liquid crystal and the need for polarisation filters in display panel)
    - voltage/current requirements and need for electric field
    - fluorescent back light (need for high frequency operation and power requirements)
    - scanning techniques (colour/row addressing and thin film transistors)
    - light attenuation (caused by the many layers/filters the back light has to pass through)
    - construction and handling
- display circuit diagnostics encompassing:
    - sub-system components (i.e. functional blocks) and their operating parameters
    - factors effecting system performance
    - typical faults, their symptoms and cause
    - fault diagnosis procedures and testing
    - sub-system adjustments
- advance electronic measuring instruments encompassing:
    - test/measuring devices and their application: frequency counters and synthesisers, spectrum analysers, noise and distortion meters, and radio frequency (RF) communications service monitor
- connection of test/measuring devices into a circuit encompassing:
    - safety procedures
    - loading and matching
    - storage and delay
    - circuit arrangement of test/measuring devices
- taking and interpreting readings
- notion of decibels, including dBm, dBr, dBu and dBo
- WHS/OHS enterprise responsibilities encompassing:
    - provisions of relevant WHS/OHS legislation
    - principles and practice of effective WHS/OHS management
    - management arrangements relating to regulatory compliance
    - enterprise hazards and risks, control measures and relevant expertise required
    - characteristics and composition of workforce and their impact on WHS/OHS management

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    - relevance of enterprise management systems to WHS/OHS management
    - analysis of working environment and design of appropriate WHS/OHS management systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in display circuits
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0025 Diagnose and rectify faults in recording and replay equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in recording and replay equipment.

It includes fault finding and repair of faults in recording and replay equipment. It also includes working safely, applying logical diagnostic methods and replay apparatus components, rectifying faults, safety and functional testing, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify recording and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	replay equipment faults	for a given work area are identified and applied
		1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for recording and replay equipment work
		1.3 Safety hazards which have not previously been identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
		1.4 Extent of fault is determined from reports, documentation and from discussions with appropriate person/s
		1.5 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the work site
		1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Diagnose and rectify recording and replay equipment faults**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out recording and replay equipment work are followed
		2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
		2.3 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4 Logical diagnostic methods are applied to diagnose recording and replay apparatus faults using measurements of circuit operating parameters in accordance with recording and replay apparatus operating specifications
		2.5 Suspected fault scenarios are tested as being the source of recording and replay apparatus problems in accordance with workplace procedures and relevant industry standards
		2.6 Faults in the electronic components of the recording and replay apparatus are rectified to recording and replay

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		apparatus operation and industry standards
	2.7	Apparatus are inspected and tested to verify that they operate as intended and to specified requirements
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and consistent with job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified in accordance with workplace procedures that recording and replay apparatus faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in recording and replay equipment must include at least the following:

- two circuit faults in two different types of recording and replay apparatus

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH177A Diagnose and rectify faults in recording and replay equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0025 Diagnose and rectify faults in recording and replay equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of apparatus faults
- identifying the cause faults using logical diagnostic methods
- rectifying faults effectively
- verifying that the recording and replay apparatus operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- connecting testing/measuring devices into a circuit in accordance with industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- recording and replay apparatus diagnostics, applying safe working practices and relevant standards, codes and regulations, including:
  - diagnosing recording and replay apparatus encompassing:
    - sub-system components (i.e. functional blocks) and their operating parameters
    - factors effecting system performance
    - typical faults, their symptoms and cause
    - fault diagnosis procedures and testing
    - sub-system adjustments
  - advance electronic measuring instruments encompassing:
    - test/measuring devices and their application: frequency counters and synthesisers, spectrum analysers, noise and distortion meters and radio frequency (RF)

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communications service monitor
- connection of test/measuring devices into a circuit encompassing:
  - safety procedures
  - loading and matching
  - storage and delay
  - circuit arrangement of test/measuring devices
- taking and interpreting readings
- notion of decibels, including dBm, dBr, dBu and dBo
- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults

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in recording and replay apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0026 Enter and verify programs for fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to enter and verify programs for fire protection systems.

It includes programming fire protection systems that include multiple connected detection, warning and fire control devices and remote monitoring. It also includes working safely, using fire protection industry standards and protocols, entering system instructions, testing functionality of fire protection components and system operation, and documenting activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0041 Install fire detection and warning system apparatus

UEEEC0076 Verify compliance and functionality of fire protection system installations

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter operating instructions	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and procedures are followed in preparation for the work
	1.3 Safety hazards that have not previously been identified are assessed, reported and advice on risk control measures sought from work supervisor
	1.4 Extent of programming work is determined from job specifications and in consultation with appropriate person/s
	1.5 Tools, equipment and testing devices needed to carry out fire protection work activities are obtained and checked for correct operation and safety
	1.6 Fire protection device installation is checked for compliance with job specification, industry standards and regulations
2 Enter software operating instructions	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Status of each function of the fire protection device is entered and their parameters set in accordance with manufacturer programming instructions
	2.4 Entered data is checked as meeting those specified by work activity and job specifications
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6 Programming is carried out efficiently without waste of materials and energy or damage to apparatus, the

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		surrounding environment or other services
3 Test fire protection device operation and report findings	**3.1**	Fire protection device operation is tested in accordance with WHS/OHS requirements and workplace procedures
	3.2	Operating anomalies are identified and corrected in accordance with workplace procedure
	3.3	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.4	Worksite is cleaned and made safe in accordance with workplace procedures
	3.5	Work completion is reported and appropriate person/s notified in accordance with workplace procedure

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Entering and verifying programs for fire protection systems must include at least the following:	• two types of microprocessor fire protection control and indicating equipment with:
	  • at least 50 input devices
	  • at least 20 output devices
	  • at least 1 system interface control
	  • at least 2 logic timers
	  • system variables

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH163A Enter and verify programs for fire protection systems.

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Links

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Assessment Requirements for UEEEC0026 Enter and verify programs for fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- apply sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- correcting programming anomalies
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- entering functions and parameters correctly
- identifying non-compliance conditions of device installation
- performing program backups, version controls and documentation
- testing and verifying device operation
- understanding required operating functions and parameters.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- fire protection systems programming methods
- input devices, including conventional alarm zones, analogue or analogue addressable fire detectors, flow switch connections or switch connections
- logic times, including software programs that control the operation of non-latching detectors and timer periods before operation of fire system suppression systems
- output devices, including shutdown signal, door or system release controls and solenoid valve controls
- program backup, version control and documentation requirements
- program loading methods and relevant information technology
- program testing methods
- relevant manufacturer specifications

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system interface controls, including verify signals to remote control and indicating equipment, building monitoring systems, paging system and colour graphics
- system variables, including standard software functions that operate smoke detector controls, dual zone alarm configurations, alarm and fault global functions
- vender programming codes and functions, including:
  - input/output (I/O) instructions
  - variables
  - timers
  - limitations of vender software.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to entering and verifying programs for fire protection systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0027 Enter instructions and test wired and wireless security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to enter instructions and test wired and wireless security systems.

It includes entering instructions and testing electronic security systems with up to 50 connected devices typically used in single domestic and small commercial premises. It also includes working safely, programming as directed in user manuals, adjusting security devices, system testing and following written and oral instruction and workplace procedures.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter instructions and test security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures are followed in preparation for security system work
	1.3 Safety hazards not previously identified are risk assessed, reported and advice on risk control measures sought from the work supervisor
	1.4 Nature and location of security system work is obtained from work supervisor or other appropriate person/s to determine the scope of work to be undertaken
	1.5 Advice is sought from the work supervisor or other appropriate person/s to ensure the work is coordinated effectively with others
	1.6 Sources of materials required for security system work are determined in accordance with workplace routines
	1.7 Tools, equipment and testing devices needed to carry out security system work are obtained and checked for correct operation and safety
2 Enter instructions and test wired and wireless security system	**2.1** WHS/OHS risk control measures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Security devices are checked for correct location and alignment

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	2.4	Security functions are entered into the security system in accordance with manufacturer instructions
	2.5	Security system is inspected and tested in accordance with manufacturer instructions
	2.6	Security system operational malfunctions are identified and corrected
	2.7	Unplanned situations are responded to in accordance with workplace procedures and discussions with immediate supervisor for directions in a manner that minimises risk to personnel and equipment
	2.8	Security program and testing is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Complete and document security system work activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Security system is documented in accordance with regulatory requirement and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Security system must consist of a controller and an access device and at least two other different connected devices, both wired and wireless and include at least the following:	• entering instructions and testing wired and wireless security systems for two security systems

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH152A Enter instructions and test wired and wireless security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0027 Enter instructions and test wired and wireless security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting ‘as-installed’ system correctly
- entering system instructions using relevant information technology
- identifying and correcting operational malfunctions
- testing system functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- access and detection functions
- diagnostic functions and their use
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security systems software function and configurations, including relevant information technology and configuration options.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to entering instructions, and testing basic wired and wireless security systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0028 Fault find and repair complex power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair complex power supplies.

It includes preparing to find and repair faults in complex power supplies, finding and repairing faults, and completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0043 Solve problems in direct current circuits

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults in complex power	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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supplies		for relevant work area are identified, obtained and applied
	1.2	WHS/OHS risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Nature of the fault is obtained from documentation or discussions with relevant person/s to determine scope of work
	1.4	Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.5	Materials required for the work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	WHS/OHS risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Apparatus is isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding is approached methodically, applying principles of complex power supplies, analysing faults through reference to block and schematic diagrams and using measured and calculated values of power supply parameters
	2.5	Apparatus components are dismantled, as necessary, and parts stored to protect against loss or damage
	2.6	Faulty components are rechecked and their fault status confirmed
	2.7	Materials required for repair work are sourced and obtained in accordance with workplace procedures
	2.8	Effectiveness of the repair is tested in accordance with workplace procedures
	2.9	Apparatus is reassembled, tested and prepared for return

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		to customer
	2.10	Unplanned situations are dealt with safely and with approval of relevant person/s
	2.11	Fault-finding and repair activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair activities	**3.1**	WHS/OHS risk control measures and workplace procedures are applied
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is made in the required format for repairs to apparatus
	3.4	Work completion is documented in accordance with workplace procedures and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in complex power supplies must include at least the following:	• fault finding two faults in each of the following types of power supply:
	  • linear regulated power supply
	  • switch mode power supply

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH138A Fault find and repair complex power supplies.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0028 Fault find and repair complex power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- efficiently finding faults
- finding and repairing faults in complex power supplies
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system
- providing justification for the repairs
- replacing components without damage
- selecting relevant test equipment and test methods
- making and analysing measurements to verify circuit operation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex power supplies fault finding and repair
- off-line switching regulators
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes

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- relevant standards, codes and regulations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- relevant principles of switching regulation
- series regulation
- series regulator employing closed loop control
- switching regulation - closed loop control of output
- block and schematic diagrams for typical power supply circuits
- heatsink selection considerations
- circuit protection methods - crowbar and current-limiting
- verification of circuit operation
- fault-finding techniques
- electromagnetic radiation (EMR) considerations with switch mode supplies
- inductance and transformer theory
- diode and semiconductor basics
- rectification and filtering.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in complex power supplies
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0029 Fault find and repair electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair electronic apparatus.

It includes preparing to find and repair faults, finding faults, and completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with

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		workplace procedures prior to commencing work
	1.3	Nature of the fault is obtained from documentation and/or from relevant person/s to determine scope of work
	1.4	Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5	Materials required for the work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding is undertaken methodically applying principles of data circuits using measured and calculated values of apparatus parameters
	2.5	Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6	Faulty components are rechecked and their fault status confirmed
	2.7	Effectiveness of the repair is tested in accordance with workplace procedures
	2.8	Apparatus is reassembled, tested and prepared for return to customer
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.10	Fault finding is conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices

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3 Complete and report repair activities	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2 Work area is cleaned and made safe in accordance with workplace procedures
	3.3 Justification is provided for repairs to apparatus in the required format
	3.4 Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in electronic apparatus must include at least the following:	• two different faults in two different electronic apparatus

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH118A Fault find and repair electronic apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0029 Fault find and repair electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- efficiently finding faults
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- drawings and diagrams
- electronic communications systems
- electronic fault finding
- electronic testing, measuring devices and techniques
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in electronic apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0030 Fault find and repair electronic medical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair electronic medical equipment.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault-finding and repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0019 Develop software solutions for microcontroller-based systems

UEEEC0028 Fault find and repair complex power supplies

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0020 Solve problems in low voltage a.c. circuits

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UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.6 Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** Workplace risk control measures and workplace procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and

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		workplace procedures
	2.3	Circuits/machines/plant are isolated, as necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose electronic medical equipment faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of the fault is identified and appropriately qualified person/s engaged to rectify the fault where it is outside the scope of capability in accordance with workplace procedures
	2.7	Faults in electronic components are rectified to raise electronic medical equipment to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made based on job specifications, work requirements and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	Workplace risk control measures and workplace procedures are applied
	3.2	Worksite is made safe in accordance with workplace procedures
	3.3	Rectification of faults is reported in accordance with workplace procedures

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3.4 Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and repairing faults in electronic medical equipment must include at least the following:

- two system faults in two different types of electronic medical equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH134A Fault find and repair electronic medical equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0030 Fault find and repair electronic medical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic medical equipment fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - medical equipment principles:
    - equipment categories, types, functions and operation
    - hazards and safety procedures
    - causes of failure

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- safety testing requirements and methods
- categories and examples of medical equipment, including:
  - cardiovascular systems: blood warmers, cardiac catheterisation systems and defibrillators
  - electrocardiogram (ECG) machines, ECG monitors, heart-lung machines and infusion
  - pumps, intra-aortic balloon pumps, pacemakers, syringe pump and cardiac output measurement equipment
  - respiratory systems: anaesthetic delivery and monitoring units, medical gases, oxygen concentrator, pulse oximeter, respiratory humidifier, respiratory support units and ventilators
  - neurological systems: electroencephalograph (EEG) recorder, electromyograph (EMG) recorder and intracranial pressure (ICP) monitoring
  - renal systems: haemodialysis machine, continuous veno-venous hemofiltration (CVVH) machine and peritoneal dialysis
  - medical imaging: x-ray equipment, computerised axial tomography (CAT scan), magnetic resonance imaging (MRI), nuclear medicine and diagnostic ultrasound equipment
  - physiological equipment: blood pressure monitors, foetal cardiotocograph, infant care systems, multiparameter systems, thermometry, telemetry, networking and patient warmers
  - miscellaneous equipment: electrosurgery, electric stimulators, and endoscopy and laparoscopy systems, laser, operating microscopes, therapeutic diathermy and ultrasound
- medical equipment, anatomy and physiology and infection control:
  - nature of infection
  - control of microbial growth
  - infection control strategies
  - body systems
- medical equipment safe working practices:
  - risk management and assessment of risk encompassing:
    - principle and purpose of risk management, and
    - processes for conducting a risk assessment
  - hazards associated with medical equipment, encompassing:
    - infections
    - toxic materials
    - electrical components
    - radiation
  - risks and control measures associated with working with medical equipment
- fault finding and repair:
  - typical faults, their symptoms and cause
  - fault diagnosis procedures and testing

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    - component replacement
    - equipment adjustments
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that assessment should reflect current industry practices in relation to diagnosing and rectifying faults in electronic medical equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0031 Fault find and repair global positioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair global positioning systems (GPS).

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault-finding and repair activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0063 Solve fundamental electronic communications system problems

UEEEC0068 Troubleshoot communication systems

and

UEECD0043 Solve problems in direct current circuits

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or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others

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	1.6	Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose GPS faults employing measurements and estimations of system operating parameters referenced to system operational requirements in accordance with workplace procedures and job specifications
	2.5	Suspected fault scenarios are tested in accordance with workplace procedures and job specifications
	2.6	Source of the fault is identified and relevant person/s engaged to rectify the fault where it is outside the scope of capability in accordance with workplace procedures and relevant industry standards
	2.7	Faults in electronic components are rectified to raise GPS to its operation standard
	2.8	System is tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are made in accordance with workplace procedures, relevant industry standards and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices

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3	**Complete and report fault-finding and repair activities**	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2 Worksite is made safe in accordance with workplace procedures
		3.3 Rectification of faults is reported in accordance with workplace procedures
		3.4 Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and repairing faults in GPS must include at least the following:

- two system faults in electronic GPS

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH132A Fault find and repair global positioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0031 Fault find and repair global positioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- global positioning system (GPS) fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - sub-system components (i.e. functional blocks) and their operating parameters
  - environment factors effecting system performance
  - typical faults, their symptoms and cause
  - fault diagnosis procedures and testing

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  - component replacement
  - sub-system adjustments
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in GPS
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0032 Fault find and repair high-volume office equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair high-volume office equipment.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault-finding and repair activities.

Permits may be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0059 Repair routine business equipment faults

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1 Prepare to find and repair faults	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Scope of the fault is obtained from documentation, relevant person/s and customer to determine work
	1.4	Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5	Materials required for work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Apparatus is checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding is undertaken methodically applying principles of office equipment and using measurements of operating parameters and built-in fault indicators in accordance with manufacturer instructions and workplace procedures
	2.5	Equipment components are dismantled, as required, and parts stored to protect against loss or damage
	2.6	Faulty components are rechecked and their fault status confirmed
	2.7	Faulty components are readjusted or replaced in accordance with workplace procedures
	2.8	Effectiveness of the repaired component is tested in accordance with workplace procedures

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	2.9	Apparatus is reassembled, tested and prepared for return to customer
	2.10	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.11	Fault finding and repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is provided in the required format for repairs to apparatus, including components and materials used
	3.4	Acceptance that the reported fault/s has been repaired is sought from relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in high volume office equipment must include at least the following:	• one fault in a high-volume printing device • one fault in a high-volume imaging device

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH121A Fault find and repair high volume office

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equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0032 Fault find and repair high-volume office equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- efficiently finding faults
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs and obtaining acceptance of repairs
- removing/adjusting/replacing components without damage
- testing equipment operation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- business machine transducers
- colour photocopier operating principles
- printing and imaging devices software functions and configuration
- imaging operating principles
- high-volume business machine functions and faults
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation

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processes
- relevant industry standards, codes and regulations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in high-volume office equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0033 Fault find and repair navigation systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair navigation systems.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault diagnosis and rectification activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0063 Solve fundamental electronic communications system problems

UEEEC0068 Troubleshoot communication systems

and

UEECD0043 Solve problems in direct current circuits

or

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UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.6 Tools, equipment and testing devices required to diagnose faults are obtained in accordance with

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		workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose navigation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements in accordance with workplace procedures and relevant industry standards
	2.5	Suspected fault scenarios are tested as being the source of system problems in accordance with workplace procedures and relevant industry standards
	2.6	Source of the fault is identified and relevant person/s engaged to rectify the fault where it is outside the scope of capability in accordance with workplace procedures and relevant industry standards
	2.7	Faults in electronic components are rectified to raise navigation system to its operation standard
	2.8	System is tested to verify it operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are made in accordance with relevant industry standards, job specifications and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report fault diagnosis and	**3.1**	WHS/OHS work completion risk control measures and

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rectification activities	workplace procedures are followed
	3.2 Worksite is made safe in accordance with workplace procedures
	3.3 Rectification of faults is reported in accordance with workplace procedures
	3.4 Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in navigation systems must include at least the following:	• two system faults of electronic navigation systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH129A Fault find and repair navigation systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0033 Fault find and repair navigation systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- documenting fault rectification
- identifying and accessing materials, tools, apparatus and testing devices
- identifying faults and competency needed to rectify them
- isolating circuits/machines/systems.
- rectifying faults in system electronics
- using fault scenarios to test the source of system faults
- verifying that the system operates correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- navigation systems fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - sub-system components (i.e. functional blocks) and their operating parameters
  - environment factors effecting system performance
  - typical faults, their symptoms and cause
  - fault diagnosis procedures and testing

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  - component replacement
  - sub-system adjustments
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in navigation systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0034 Fault find and repair radar apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair radar apparatus and systems.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault-finding and repair activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0063 Solve fundamental electronic communications system problems

UEEEC0068 Troubleshoot communication systems

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

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UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s and control measures implemented
	1.4 Extent of faults are determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others

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	1.6	Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose radar apparatus and systems faults employing measurements and estimations of system operating parameters referenced to system operational requirements in accordance with workplace procedures and relevant industry standards
	2.5	Suspected fault scenarios are tested as being the source of system problems in accordance with workplace procedures and job specifications
	2.6	Source of the fault is identified and relevant person/s engaged to rectify the fault where it is outside the scope of capability in accordance with workplace procedures and relevant industry standards
	2.7	Faults in the electronic components of the system are rectified to raise radar apparatus and system to its operation standard in accordance with workplace procedures and job specifications
	2.8	System is tested to verify system operates in accordance with workplace procedures and job specifications
	2.9	Decisions for dealing with unplanned situations are made in accordance with workplace procedures, relevant industry standard and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out

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		efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3	**Complete and report fault-finding and repair activities**	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2 Worksite is made safe in accordance with workplace procedures
		3.3 Rectification of faults is reported in accordance with workplace procedures
		3.4 Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and repairing faults in radar apparatus and systems must include at least the following:	• two system faults in electronic radar apparatus and systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH131A Fault find and repair radar apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0034 Fault find and repair radar apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- radar apparatus and system fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - electronic communications, secondary radar and related systems:
    - secondary radar principles encompassing:
      - role of secondary radar
      - transponder operation

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- operating principles
- signal processing
- pulse generation, transmission and detection
- mode generation, detection and response
- display symbol generation
- synchronisation with primary radar
- advantages over primary radar with respect to clutter
- signal/noise ratio; transmit power required for operation

- interfaces to other systems providing information for transmission of mode data encompassing:
  - slaving/synchronisation to primary radar
  - clutter reduction/elimination
  - defruiting
  - degarbling
  - interfaces to other systems
  - range/ducting effects
  - advantages over primary radar
  - power supplies and uninterrupted power supplies (UPS)
  - international standards
  - national curriculum
  - hot standby, cold standby
- application of secondary radar systems - traffic collision avoidance system (TCAS), selective identification system (SIF), air traffic control radar beacon system (ATCRBS), instrument landing system (ILS), tactical air navigation (TACAN), navigation systems (VOR, GPS and DME), radar altimeter, jamming, electronic warfare, second time round returns (STRR), and identification–friend or foe radar (IFF)

- electronic communications, radar and sonar displays devices:
  - types and their applications – cathode-ray tube (CRT), plasma, liquid-crystal display (LCD), monochrome, colour and touch screen
  - sub-system components (i.e. functional blocks) and their operating parameters encompassing:
    - extra high tension (EHT) transformers
    - detectors
    - video distribution
    - time base generators
    - phase locked loops
    - microprocessors
    - memory devices
    - demodulators
    - focusing/deflection devices

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        - delay lines
        - bleed resistors
        - high voltage (HV) generation
    - calibration testing and maintenance procedures:
    - typical fault finding, their symptoms and cause
- electronic communications, radar fundamentals:
    - hazards and risk control measures
    - purpose and uses of radar
    - environmental conditions affecting radar
    - design factors which affect performance
    - propagation of electromagnetic waves
    - pulse forming circuits
    - typical radar transmitter encompassing:
        - limitations and applications of each type
    - typical radar receivers encompassing:
        - sub-system components (i.e. functional blocks) and their operating parameters
        - limitations and applications
    - radar antennae encompassing:
        - types, application and radiation patterns - parabolic, phased array, log periodic, and cos q
        - antenna gain
        - efficiency
        - length and height factors
    - microwave techniques, devices and applications encompassing:
        - oscillators
        - amplifiers
        - modulators and demodulators
        - mixers and detectors
    - types and characteristics of various radar systems
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in radar apparatus and systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0035 Fault find and repair satellite-based surveillance and observation systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair satellite-based surveillance and observation systems.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting fault-finding and repair activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0063 Solve fundamental electronic communications system problems

UEEEC0068 Troubleshoot communication systems

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is

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		coordinated effectively with others
	1.6	Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose satellite-based surveillance and observation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements in accordance with workplace procedures and relevant industry standards
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of the fault is identified and relevant person/s engaged to rectify the fault where it is outside the scope of capability in accordance with workplace procedures and relevant industry standards
	2.7	Faults in the electronic components of the system are rectified to raise satellite-based surveillance and observation system to its operation standard
	2.8	System is tested to verify that the system operates as intended and to specified requirements in accordance with workplace procedures and job specifications
	2.9	Decisions for dealing with unplanned situations are made in accordance with relevant industry standards, job specifications and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes

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	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace procedures
	3.3	Rectification of faults is reported in accordance with workplace procedures
	3.4	Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in satellite-based surveillance and observation systems must include at least the following:	• two system faults of electronic satellite-based surveillance and observation systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH130A Fault find and repair satellite-based surveillance and observation systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0035 Fault find and repair satellite-based surveillance and observation systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- documenting fault rectification
- identifying and accessing materials, tools, apparatus and testing devices
- identifying faults and competency needed to rectify them
- isolating circuits/machines/system.
- rectifying faults in system electronics
- using fault scenarios to test the source of system faults
- verifying that the system operates correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- satellite-based surveillance and observation systems, fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - types of satellite systems and sub-systems
  - earth station locality and antenna parameters
  - link specifications and link calculations
  - base band signalling processes

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  - modulation and system access
  - sub-system components (i.e. functional blocks) and their operating parameters
  - environment factors effecting system performance
  - typical faults, their symptoms and cause
  - fault diagnosis procedures and testing
  - component replacement
  - sub-system adjustments
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in satellite-based surveillance and observation systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0036 Fault find and repair sonar apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair sonar apparatus and systems.

It includes safe working practices, interpreting diagrams, applying logical diagnostic methods and knowledge of sonar system components, rectifying faults, safety and functional testing, and completing service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0019 Develop software solutions for microcontroller-based systems

UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

UEEEC0068 Troubleshoot communication systems

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of faults are determined from reports, other documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.6 Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair fault	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods are applied to diagnose sonar apparatus and system faults employing measurements and estimations of system operating parameters referenced to system operational requirements

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	2.5	Suspected fault scenarios are tested in accordance with workplace procedures and job specifications
	2.6	Source of the fault is identified and relevant person/s engaged to rectify fault in accordance with workplace procedures and relevant industry standards
	2.7	Faults in electronic components are rectified to raise sonar apparatus and system to its operation standard
	2.8	System is tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are made based on job specifications and requirements and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace procedures
	3.3	Rectification of faults is reported in accordance with workplace procedures
	3.4	Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in sonar apparatus and systems must include at least the following:	• two system faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH140A Fault find and repair sonar apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0036 Fault find and repair sonar apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- sonar apparatus and system fault finding and repair, safe working practices and relevant standards codes and regulations, including:
  - electronic communications, sonar system operating principles:
    - the purpose and application of sonar systems
    - sonar equipment encompassing:
      - types and their applications

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- sub-system components (i.e. functional blocks) and their function encompassing:
  - transducer
  - input amplifier
  - sonar interface unit
  - beam forming network (transmit/receive)
  - signal processing
  - own Doppler nullification
  - display system
  - headset
  - interfaces
  - transmitter
  - T/R switch
  - timer/timing
- sonar operating parameters
- sonar transmission characteristics

- electronic communications, sonar transducers and arrays:
  - hazards and risk control measures
  - transducer types, their operating principles and parameters
  - transducer array encompassing:
    - types and their construction
    - applications
  - transducer hull outfits
  - beam forming principles and requirements
  - transducer installation and operational maintenance
- electronic communications, sonar measurement and set-up:
  - sonar parameters and measurements
  - sonar physical parameters
  - constraints and consequences
- electronic communications, radar and sonar displays devices:
  - types and their applications – cathode-ray tube (CRT), plasma, liquid-crystal display (LCD), monochrome, colour and touch screen
  - sub-system components (i.e. functional blocks) and their operating parameters encompassing:
    - extra high tension (EHT) transformers
    - detectors
    - video distribution
    - time base generators
    - phase locked loops
    - microprocessors
    - memory devices

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        - demodulators
        - focusing/deflection devices
        - delay lines
        - bleed resistors
        - high voltage (HV) generation
    - calibration testing and maintenance procedures
    - typical fault finding, their symptoms and cause
- advanced electronic (sonar) testing and measuring devices and techniques:
    - test/measuring devices and their application - frequency counters, and synthesisers, spectrum analysers, noise and distortion meters and radio frequency (RF) communications service monitor
    - connection of test/measuring devices into a circuit encompassing:
        - safety procedures
        - loading and matching
        - storage and delay
        - circuit arrangement of test/measuring devices
    - taking and interpreting readings
    - notion of decibels, including dBm, dBr, dBu and dBo
- fault finding and repair:
    - typical faults, their symptoms and cause
    - fault diagnosis procedures and testing
    - component replacement
    - equipment adjustments
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in sonar apparatus and systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0037 Fault find and repair telecommunication apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair telecommunication apparatus and systems.

It includes preparing to find and repair faults, finding and repairing faults, and completing and reporting on fault-finding and repair activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0019 Develop software solutions for microcontroller-based systems

UEEEC0028 Fault find and repair complex power supplies

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0065 Solve problems in basic electronic circuits

or

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair fault	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s and control measures implemented
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is

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		coordinated effectively with others
	1.6	Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair fault	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose telecommunication apparatus and system faults employing measurements and estimations of system operating parameters referenced to system operational requirements in accordance with workplace procedures and relevant industry standards
	2.5	Suspected fault scenarios are tested in accordance with workplace procedures and relevant industry standards
	2.6	Source of the fault is identified and relevant person/s engaged to rectify the fault in accordance with workplace procedures and relevant industry standards
	2.7	Faults in electronic components are rectified to raise telecommunication apparatus and system to its operation standard
	2.8	System is tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are made based on job specifications, work requirements and discussions with relevant person/s
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services

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			applying sustainable energy practices
3	**Complete and report fault-finding and repair activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2	Worksite is made safe in accordance with workplace procedures
		3.3	Rectification of faults is reported in accordance with workplace procedures
		3.4	Relevant person/s is notified that the system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and repairing faults in electronic telecommunication apparatus and systems must include at least the following:	• two system faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH133A Fault find and repair telecommunication apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0037 Fault find and repair telecommunication apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the source of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system electronics
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- telecommunication apparatus and system fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - telephone system fundamentals:
    - the transmission of sound in a telephone system encompassing:
      - function of telephone transmitters and receivers
      - components and functions of the telephone

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- purpose of earthing and protection in a telephone system
- customer switching systems encompassing:
  - basic function
  - difference between a key system and a private automatic branch exchange (PABX)
  - advanced features
- basic operations of system distribution frames (SDF)/test point frames (TPF), power fail and line interface requirements (e.g. indial, rotary groups, ISDN, extension and tie-line circuits)
- types, purpose, use, and requirements of metering devices
- metering and installation arrangements of public/pay phones
- installation methods and requirements encompassing:
  - customer switching systems (CSS)
  - interfacing equipment
  - termination of CSS equipment
- requirements for programming of CSS
- hazard associated the electronic components of CSS encompassing:
  - static discharge
  - chemical damage
  - mechanical damage
  - electromagnetic Interference

- telephone network facilities:
  - network subsystems (i.e. functional blocks) components and operating parameters
  - switches within the network
  - customer accesses infrastructure
  - system security
- telecommunication earthing and protection:
  - telecommunication overvoltage protection system:
    - operating principles
    - overvoltage and surge/spike suppression protection techniques
    - overvoltage protection devices
    - installation of overvoltage protection systems
  - earthing protection system encompassing:
    - components and arrangement of the multiple earth network (MEN) system
    - TELEX functional earth system
    - telecommunication system earthing single and multi-storey
    - communication earth system
    - protective earth barriers for segregation, cable tray, duct and metal equipment enclosures
  - electrical interference encompassing:
    - types – radio frequency interference (RFI) and electro-magnetic interference

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(EMI)
        - sources of interference
        - techniques in reducing interference
        - earthing cable shields
    - earth testing instruments and procedures
    - safety issues to be considered with earthing and bonding
- PABX fundamentals:
    - programming methods
    - configuration options
    - programming options
- switches, hubs and routers:
    - purpose and function
    - circuit configurations
    - connection arrangements
    - system protocols
- decoders:
    - purpose and function
    - circuit configurations
    - connection arrangements
    - system protocols
- fault finding and repair:
    - typical faults, their symptoms and cause
    - fault diagnosis procedures and testing
    - component replacement
    - system adjustments
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in telecommunication apparatus and systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair microwave amplifier section faults in electronic apparatus.

It includes preparing to find and repair faults, finding faults, repairing faults, and completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0063 Solve fundamental electronic communications system problems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the fault is identified from documentation or from relevant person/s to determine the scope of work
	1.4 Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find faults	**2.1** WHS/OHS risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is undertaken methodically applying principles of microwave amplifier sections and circuits using measured and calculated values of apparatus parameters

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	2.5	Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6	Faulty components are rechecked and their fault status confirmed
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Fault finding is conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Repair fault	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Apparatus is checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	3.3	Materials required for repair work are sourced and obtained in accordance with workplace procedures
	3.4	Repairs are conducted efficiently without damage to other components, apparatus or circuits
	3.5	Effectiveness of repair is tested in accordance with workplace procedures
	3.6	Apparatus is reassembled, tested and prepared for return to customer
4 Complete and report repair activities	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Work area is cleaned and made safe in accordance with workplace procedures
	4.3	Justification is provided for repairs to apparatus in the required format
	4.4	Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing faults in microwave amplifier sections must include the following:

- at least two types of electronic apparatus

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH116A Find and repair microwave amplifier section faults in electronic apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0038 Find and repair microwave amplifier section faults in electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- efficiently finding faults
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic microwave communications systems, including:
  - advanced electronic (communication systems) testing and measuring devices and techniques
  - electronic (communication systems) fault finding
  - electronic communications, microwave antennae and waveguide fundamentals
  - microwave amplifiers, including:
    - amplifier components and circuit configuration

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    - amplifier faults, symptoms and causes
    - applications and operational constraints
    - operating principles and parameters
  - relevant industry standards, codes and regulations
  - software programming fundamentals
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in the microwave amplifier sections in electronic apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0039 Install and test microwave antennae and waveguides

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and test microwave antennae and waveguides.

It includes preparing to install and test microwave antennae and waveguides, installing microwave antennae and waveguides, testing microwave antennae and waveguides, and reporting outcomes.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install and test microwave antennae and waveguides**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
		1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
		1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
		1.4 Nature and location of the work is obtained from relevant person/s to determine scope of work
		1.5 Instructions for coordinating work with others are obtained from relevant person/s and applied
		1.6 Materials required for the work are determined in accordance with workplace procedures
		1.7 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install microwave antennae and waveguides**	**2.1** Workplace risk control measures and procedures are applied
		2.2 Circuits/components are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
		2.3 Antennas are installed in specified locations and within limitations imposed by regulations
		2.4 Hardware and accessories are installed straight and square in the required locations and within acceptable tolerances
		2.5 Cables and conductors are terminated at accessories in accordance with relevant industry standards, manufacturer instructions and job specifications
		2.6 Unplanned events are referred to relevant person/s in accordance with workplace procedures
		2.7 Installation is conducted efficiently, without waste of materials, damage to apparatus circuits or the surrounding environment applying sustainable energy practices

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3 Test microwave antennae and waveguides and report	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Pre-commissioning adjustments are made to the installation and the system to optimise performance in accordance with system specifications
	3.3	Worksite is cleaned and made safe in accordance with workplace procedures
	3.4	Relevant person/s is notified of installation completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, connecting and adjusting any microwave antennae and waveguides must include at least the following:

- antennas
- rectangular sections
- curved sections
- T sections
- joints and couplers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH128A Install and test microwave antennae and waveguides.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0039 Install and test microwave antennae and waveguides

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- accurately installing and securing antenna, waveguide hardware and accessories
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- correctly terminating cable and conductors
- dealing effectively with unplanned events
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/components
- pre-commission adjusting for optimum performance
- reading and interpreting drawings of circuit arrangements and component locations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- antenna and wave guide principles and components
- electronic communications, microwave antennas and waveguide fundamentals
- installation techniques for microwave communication systems
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- setting up and testing techniques for microwave communication systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing microwave and antennae and waveguides
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0040 Install commercial video/audio system components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install commercial video/audio system components.

It includes preparing to install audio/video components and systems, installing audio/video system components, completing installation work and reporting.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install audio/video system components**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
		1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
		1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
		1.4 Nature and location of the work is obtained from relevant person/s to determine the scope of work
		1.5 Instructions for coordinating work with others are obtained from relevant person/s and applied
		1.6 Materials required for work are determined in accordance with workplace procedures
		1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	**Install audio/video system components**	**2.1** Workplace risk control measures and procedures are applied
		2.2 Circuits/equipment are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
		2.3 Audio/video components are installed in accordance with relevant industry standards and job specifications with sufficient excess to effect terminations
		2.4 Accessories are installed straight and square in the required locations in accordance with relevant industry standards and job specifications
		2.5 Cables and conductors are terminated at accessories in accordance with manufacturer specifications and relevant industry standards
		2.6 Unplanned events are reported to relevant person/s in accordance with workplace procedures
		2.7 Installation is conducted efficiently without waste of materials, damage to apparatus, circuits or the surrounding environment applying sustainable energy

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		practices
3 Complete installation work and report	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Relevant person/s is notified of installation completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing commercial video/audio system components must include at least the following:	• installing and connecting one commercial audio/video system components in one building or premise, examples include:
	  • dedicated audio and video facilities in meeting rooms
	  • video conferencing facilities
	  • centrally controlled audio/video facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH110A Install commercial video/audio system components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0040 Install commercial video/audio system components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- accurately placing and securing components and accessories
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- connecting apparatus and associated components to comply with requirements
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- reading and interpreting drawings of system arrangements and component locations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial audio/video system installation, including:
  - audio reproduction electronic components:
    - graphic equalisers
    - power and integrated amplifiers
    - preamplifiers
  - audio reproduction
  - audio/video control equipment
  - audio/video recording and replay components basic faults and repairs
  - fundamentals of:
    - sound reproduction

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    - speakers
  - loudspeakers and microphones
  - professional audio electronics
  - relevant industry standards, codes and regulations
  - specialist audio/video cabling installation and termination
  - video and display set-up
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective (PPE) equipment currently used in industry
- resources that reflect current industry practices in relation to installing commercial audio/video system components
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0041 Install fire detection and warning system apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install fire detection and warning system apparatus.

It includes installing electronic fire detection and warning systems in buildings and premises. It also includes working safely and to industry standards, following oral and written instructions and workplace procedures, and securely placing and connecting fire detection system and warning components.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble fire	**1.1** Work health and safety (WHS)/occupational health and

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detection and warning apparatus		safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2	WHS/OHS risk control measures are followed in preparation for work
	1.3	Safety hazards that have not previously been identified are reported and advice on risk control measures sought from the work supervisor
	1.4	Nature and location of the work is obtained from work supervisor or appropriate person/s to determine the scope of work to be undertaken
	1.5	Advice is sought from work supervisor or other relevant person/s to ensure the work is coordinated effectively with others
	1.6	Sources of materials required for work activities are determined in accordance with workplace procedures
	1.7	Tools, equipment and testing devices needed to carry out work activities are obtained and checked for correct operation and safety
2 Assemble and set up fire detection and warning system	**2.1**	WHS/OHS risk control measures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Fire protection controller and detection and warning devices are located for optimum performance in accordance with customer requirements, industry standards and regulations
	2.4	Accessories are installed straight and square in the required locations and within acceptable tolerances
	2.5	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.6	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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	2.7	Fire protection installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Complete fire detection and warning system apparatus installation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with established procedures
	3.3	Fire protection system is documented in accordance with regulatory requirements and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing fire detection and warning system apparatus must include at least the following:	• two fire alarms and warning systems, including:
	  • one fire alarm system with at least one control and indicating panel, 50 input devices, five output devices and two system interface controls on at least one of the following:
	  • analogue addressable system
	  • addressable system
	  • conventional system
	  • one fire warning system with at least one control and indicating panel, 50 speakers, five interface communication devices and two warning indicators on at least one of the following:
	  • analogue addressable system
	  • addressable system

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- conventional system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH161A Install fire detection and warning system apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0041 Install fire detection and warning system apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- apply sustainable energy principles and practices
- applying industry standards and codes of practice for fire protection systems and equipment
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using of risk control measures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting installation
- maintaining fire integrity
- placing and securing devices and accessories accurately
- reading and interpreting relevant documents with apparatus/device locations and connection arrangements
- terminating cable and conductors correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- common operation and interface connections to other systems
- common operation and types of field data gathering equipment
- common operational requirements and types of control and indicating equipment
- effective and ineffective locations for fire detection devices and common causes of false alarms
- fire protection and warning system installations regulations
- fire protection technologies, fire detection and warning systems, technical industry standards and regulations
- hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents
- input devices, including conventional alarm zones, analogue or analogue addressable fire

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detectors, flow switch connections or switch connections
- interface communication devices, including warden in communication phones and remote public address (PA) inputs
- operating principles and characteristic of the various warning system components
- operating principles and characteristic of types of fire alarm detectors
- output devices, including shutdown signal, door or system release controls and solenoid valve controls
- purpose and interface requirements of smoke hazard management system
- purpose and operating principles of fire detection and warning systems
- purpose of fire alarm and warning systems
- relevant job safety assessments or risk mitigation processes, including:
  - relevant risk control measures used for dealing with the hazards related to fire protection systems
  - risks and control measures associated with fire protection equipment
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures, including:
  - interface procedures to isolate control functions between different fire protection building service systems
  - procedures for isolating/reinstating fire protection systems to inhibit back-to-base signals to monitoring station
  - procedures for isolating/reinstating fire protection systems to inhibit alarms operating fire protection suppression equipment
  - procedures for isolating/reinstating sections or parts of a fire protection system to inhibit alarms during building maintenance or system testing
  - relevant workplace procedures for isolating/reinstating and disconnection and reconnection of supplies in excess of ELV
- system interface controls, including communication signals to remote control and indicating equipment, building monitoring systems, paging system and colour graphics
- warning devices and their operating parameters
- warning indicators, including flashing lights for hearing impaired persons and fire brigade building indication.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to positioning and terminating fire detection and warning system apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0042 Install large security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install security systems.

It includes installing, entering instructions, inspecting and testing of electronic wired and wireless security systems with over 50 connected devices in buildings, premises and precincts. It also includes working safely and to industry standards, following job specifications, securely placing and connecting security system components, and documenting service installation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and set up wired and wireless security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures are followed in preparation for security system work
	1.3 Safety hazards not previously identified are risk assessed, reported and advice on risk control measures sought from work supervisor
	1.4 Nature and apparatus location of the security system work is determined from work supervisor or other appropriate person/s and drawings related to cable layouts and locations to establish the scope of work to be undertaken are identified
	1.5 Advice is sought from the work supervisor or other appropriate person/s to ensure the security system work is coordinated effectively with others
	1.6 Sources of materials required for the security system work are determined in accordance with workplace routines
	1.7 Tools, equipment and testing devices needed to carry out the security system work are obtained and checked for correct operation and safety
2 Install wired and wireless security system	**2.1** WHS/OHS risk control measures for carrying out security system work are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Security controllers and devices are located for optimum performance within limitations imposed by customers,

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		industry standards and regulations
	2.4	Accessories and devices are installed, straight and square, in the required locations and within acceptable tolerances
	2.5	Cables and conductors are terminated at accessories and devices in accordance with manufacturer specifications, industry standards and regulatory requirements
	2.6	Methods for dealing with unplanned situations are discussed with appropriate person/s and documented
	2.7	Unplanned situations are dealt with in accordance with workplace procedures safely and with the approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.8	Security installation is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Set up wired and wireless security system and document work activity	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Security system installation is documented in accordance with regulatory requirement and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installation of security system must have	• two large wired and wireless security

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controllers and include at least the following:	systems with more than 50 connected devices of five different types

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH151A Install large security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0042 Install large security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting installation
- maintaining fire integrity
- placing and securing devices and accessories accurately
- reading and interpreting drawings related to cable layouts and apparatus locations
- terminating cable and conductors correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- advanced electronic security systems, including connection of input/output (I/O) devices to detectors and control panels
- biometric devices, including biometrics techniques and processes
- camera lens, including types of lenses and their characteristics
- closed-circuit television (CCTV) cameras, including types of cameras and sub-system components (functional blocks) and their operating parameters
- CCTV systems application, including sub-system components (functional blocks) and their function
- installation and mounting, including consideration in locating and mounting CCTV camera and auxiliary equipment
- monitors and recording devices, including types, analogue and digital recording devices and their application

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- relevant biometrics security and privacy regulations and legislation
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant security devices
- relevant security industry standards
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security systems
- security video monitoring and recording
- television principles, including sub-system components (functional blocks) and video signals.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing wired and wireless security systems with more than 50 connected devices in buildings, premises or precincts
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0043 Manage computer systems/electronics projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage computer systems/electronics projects.

It includes establishing project scope, managing computer systems/electronics projects, and completing and reporting on projects.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Establish the scope of the projects	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Project deliverables and objectives are determined from project planning, other relevant documentation and/or

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		discussions with appropriate person/s
	1.3	Work breakdown structure (WBS) is developed to identify component parts of the project in accordance with workplace procedures
	1.4	Major milestones and deliverables are identified
	1.5	Resources needed to meet project outcome are determined
	1.6	Processes and procedures to manage the project scope are developed from discussions with relevant person/s and in accordance with project requirements
	1.7	Risks are identified and strategies developed to ensure project outcomes are achieved to the required quality standards specified in the project requirements
	1.8	Project plan is developed which meets project requirements and is in accordance with workplace standards and procedures
2 Manage computer systems/electronics projects	**2.1**	WHS/OHS programs are implemented and monitored in accordance with workplace procedures
	2.2	Achievement of project outcomes is delegated to relevant person/s in accordance with project deliverables and objectives
	2.3	Risk events are monitored and project plan strategies implemented to ensure that outcomes are achieved to the required quality standards specified in the project requirements
	2.4	Procurement processes and procedures are monitored to ensure on-time supply of equipment and materials and in accordance with organisation policy
	2.5	Verification of the project technical design modification, installation and/or maintenance of system and equipment parameters is frequently made against specifications and workplace procedures
	2.6	Project progress is monitored against schedule, quality requirements and budget
	2.7	Conflict/s at worksite and/or between stakeholders, clients and regulators are identified and managed in

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		accordance with workplace procedures
	2.8	Variations are managed in accordance with agreed processes and project requirements
	2.9	Project records are maintained and progress reports prepared and forwarded to all relevant person/s
3 Complete projects and document	**3.1**	Project outcomes are reviewed against original plan, implemented risk strategies, project requirements, safety record and budget
	3.2	Project completion acceptance is sought from relevant person/s and handed over in accordance with organisation policy and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Managing computer systems/electronics projects must include at least the following:	• one medium-sized electronics/computer systems project (recognised by a representative peer group of industry experts as medium sized), including:
	  • design
	  • modifications
	  • installation and/or maintenance of systems and equipment
	  • attributes that include management of:
	  • safety
	  • budget variation
	  • personnel
	  • resources
	  • critical path timelines
	  • completion documentation

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WBS must include the following:	• identifying manageable components of a project, including their hierarchical structure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH141A Manage computer systems/electronics projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0043 Manage computer systems/electronics projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- accurately establishing the scope of the project
- coordinating work with relevant personnel
- dealing effectively with unplanned events
- developing project plans
- developing work breakdown structure (WBS)
- effectively managing resources and variations
- implementing relevant risk identification, assessment, reporting and control strategies
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- maintaining records and submitting progress reports
- managing time effectively
- meeting project outcomes
- resolving conflicts
- verifying the project technical design, modification, installation and/or maintenance of system and equipment parameters.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- computer systems/electronics project management, including:
  - concepts and practices of managing:
    - communication
    - contracts
    - customer/client relations
    - human and physical resources

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    - procurement
    - quality
    - risk
  - electronic/computer systems industry sector customs and practices
  - financial management:
    - costs, variations and estimations
    - project budgets
  - performance assessment and continuous improvement
  - principles of project planning and management:
    - defining project parameters
    - project phases and the relationship between phases
    - project scope
    - project stakeholders and clients
    - quality requirements and limitations
    - resource requirements and limitations
    - time requirements and limitations
  - relevant industry standards, codes and regulations
  - time management
- relevant manufacturer specifications
- job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- WBS.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- resources that reflect current industry practices in relation to managing electronic/computer systems projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0044 Modify - redesign electronics and communications systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to modify and redesign electronics and communications systems.

It includes modification and redesign of electronics and communications system to augment existing systems for clients. It also includes safe working practices, system parameter reconfiguration, analysis to assure optimum performance, following procedures, and documenting final modifications and settings.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to modify/redesign	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	electronics and communications system	for a given work area are obtained and applied
		1.2 WHS/OHS risk control measures and workplace procedures in preparation for work activity are followed
		1.3 Safety hazards that have not previously been identified are noted on job safety assessment, assessed and risk control measures implemented
		1.4 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
		1.5 System operating parameters are identified by reviewing system specifications and component technical data
		1.6 Limitations, use and operation of the electronics and communication system to be modified are determined from original specifications, manufacturer data and industry standards
		1.7 Extent of modification is determined from measurements, tests, inspections, system limitations and other relevant requirements
		1.8 Specifications and instructions for the modifications are documented in accordance with job requirements and workplace procedures
		1.9 Tools, equipment, applications and devices needed for the electronics work are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.10 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with job requirements and specifications
2	**Generate modification and redesign of electronics and communications system**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2 Alternative modification is considered and discussed with appropriate person/s
		2.3 Safety, functionality and economic considerations are incorporated in the proposed modification design

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	2.4 Proposed communications system modification complies with job requirements and specifications for system design alteration are documented
	2.5 Changes in the use and operation of the communications system as a consequence of the proposed modification are included in the design documentation
	2.6 Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and job specifications or requirements in a manner that minimises risk to personnel and equipment
	2.7 Modification and redesign are carried out efficiently without unnecessary waste of materials or damage to electronics apparatus, the surrounding environment or services using sustainable energy principles
3 Complete design and report modification activities	**3.1** WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2 Proposed modification is checked in accordance with workplace procedures for compliance with relevant job requirements and industry standards
	3.3 Worksite is cleaned and made safe in accordance with workplace procedures
	3.4 Proposed modification is submitted for appropriate organisational approval and, as required, statutory or regulatory approval
	3.5 Approved copies of the communications system modification and redesign documents are issued and copies retained, documented and stored in records in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Modifying/redesigning electronics and communications systems must include at least the following:

- two different and representative types of electronics and communications systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH168A Modify - redesign of electronics and communications systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0044 Modify - redesign electronics and communications systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative redesigns
- developing the modified/redesigned system within the safety and functional requirements and budget limitations
- documenting and presenting modifications/redesigns effectively
- successfully negotiating system alteration requests
- obtaining approval for final modified/redesigned system
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic and communications engineering design processes
- functional and non-functional requirements of a customer encompassing:
  - scope of the project
  - non-functional requirements, including:
    - economics (time and cost), including total life cycle costs
    - design
    - implementation (construction)
    - maintenance (operation)
    - decommissioning (recycling)
    - aesthetics (quality)
    - design objectives (specifications)

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  - specifications by defining the problem and producing a solution to satisfy the customer
  - creation of the design plan through solution synthesis by selecting or creating the solution
  - analysis
  - optimisation of the proposed solution
  - validations of the resulting design against the customer's needs
  - implementation of the selected design
  - project to be carried out in accordance with current WHS/OHS procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to modifying and redesigning electronics and communications systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0045 Modify digital signal processing (DSP) based sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to modify electronic digital signal processing (DSP) based sub-systems.

It includes following design brief, applying knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, testing developed sub-system prototype operation, and documenting design and development work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify DSP based system modification requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed,

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		and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of proposed electronic DSP based sub-system is determined from design brief in consultation with relevant person/s
	1.4	Design development work is planned to meet scheduled timelines in consultation with persons/s involved on the worksite
	1.5	Materials and devices/components required to modify sub-system are determined on compatibility of design specifications with DSP based sub-system requirements and project budget constraints
2 Modify DSP based sub-system prototype	**2.1**	WHS/OHS risk control measures and workplace procedures are followed
	2.2	Digital and analogue elements used in DSP based systems and industry compliance standards are applied to the sub-system design
	2.3	Alternative design modifications are considered based on the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design
	2.5	Prototype devices and circuits are constructed, programmed and tested for compliance with the design brief and regulatory requirements
	2.6	Prototype faults are rectified and retested to ensure effective operation of design
	2.7	DSP based system modification is documented for submission to appropriate person/s for approval
	2.8	Solutions to unplanned situations are implemented in accordance with workplace policy
3 Obtain design approval for electronic DSP based sub-system modification	**3.1**	DSP based sub-system modification is presented and explained to client representative and/or relevant person/s
	3.2	Alterations to the design are negotiated with relevant person/s within the constraints of workplace policy, as required

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3.3 Final sub-system design is documented and approval obtained from appropriate person/s

3.4 Quality of work is monitored against performance agreement and/or workplace or relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH184A Modify digital signal processing (DSP) based sub-systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0045 Modify digital signal processing (DSP) based sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- constructing digital signal processing (DSP) based sub-system prototypes
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- obtaining design approval for final modification
- developing the DSP sub-system design modification within the safety and functional requirements and budget limitations
- documenting action/s justification to be implemented in accordance with relevant industry standards
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- planning to modify DSP based system
- reading and interpreting design brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- design brief specifications and work requirements
- digital and analogue devices
- digital processing steps in practical DSP applications
- DSP requirements
- DSP current industry practices and technologies, including:
  - currently available DSP support chips
  - relevant materials and devices/components

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- DSP development technologies, including:
  - concept of complex signals
  - data-rate conversion
  - discrete Fourier transform (DFT) to a signal
  - DSP system
  - fast Fourier transform (FFT)
  - finite impulse response (FIR) filtering using FFT
  - high-order infinite impulse response (IIR) filter
  - IIR filter
  - modulation and de-modulation techniques
- prototype devices and circuit construction/build requirements
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant industry standards, regulations, codes of practice and WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in similar workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated similar workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to modifying DSP based systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0046 Operate and maintain amateur radio communication stations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to operate and maintain amateur radio communication stations.

It includes applying correct operating procedures, using safe working practices and testing techniques, dismantling and assembling apparatus, disconnecting and reconnecting components, and operating to the relevant industry standard.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to operate an amateur radio communication station	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for amateur radio activities
	1.3	Scope of operation of activity is identified in accordance with relevant industry standards
	1.4	Sources of materials required for the amateur radio activities are identified and utilised in accordance with manufacturer specifications and workplace procedures
	1.5	Interference with other services is recognised and maintained in accordance with operating practices and advice is sought from relevant person/s
	1.6	Resources, tools, apparatus and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Operate an amateur radio communication station	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test and measure equipment is determined in accordance with WHS/OHS and workplace procedures
	2.3	Circuits/apparatus are checked and isolated in accordance with WHS/OHS and workplace procedures
	2.4	Radio communications operating practices are demonstrated in accordance with workplace procedures and applicable radio spectrum regulations
	2.5	Amateur radio communication station is operated in accordance with relevant industry standards
	2.6	Methods for dealing with unplanned situations are selected on the basis of safety discussions with relevant person/s and/or specified work outcomes
	2.7	Set-up is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Maintain an amateur radio communication station	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Dismantled modules/sub-assemblies are tagged for

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		reassembly and stored to protect them against loss or damage
	3.3	Apparatus is dismantled and assembled in accordance with manufacturer guidelines
	3.4	Repairs are conducted without damage to other components, apparatus or circuits in accordance with workplace procedures
	3.5	Repairs are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	3.6	Apparatus is assembled in an appropriate sequence with all modules/sub-assemblies and parts correctly placed, secured and connected in accordance with manufacturer guidelines and relevant industry standards
	3.7	Repaired radio equipment is inspected, tested and returned to service to ensure operating parameters are in accordance with relevant industry standards and applicable radio spectrum regulations
	3.8	Workplace procedures for referring unplanned events to relevant authorities are followed
	3.9	Work and operating area is cleaned and made safe in accordance with workplace procedures
4 Identify and assemble amateur radio communication equipment	**4.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	4.2	Items are identified for assembly
	4.3	Item is assembled in accordance with workplace procedures and relevant engineering standards
	4.4	Assembled unit is tested and operating parameters of the station are in accordance with workplace procedures, relevant industry standards and applicable radio spectrum regulations
	4.5	Adjustments are made to equipment, as required, for optimise reception
	4.6	Equipment is commissioned as constructed for on-air

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		performance
5 Complete work and maintain reports	**5.1**	WHS/OHS work completion risk control measures and procedures are followed
	5.2	Worksite is cleaned and made safe in accordance with workplace procedures
	5.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEB101A Operate and maintain amateur radio communication stations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0046 Operate and maintain amateur radio communication stations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including risk control measures
- assembling apparatus in an appropriate sequence with all modules/sub-assemblies and parts correctly placed
- carrying out set-up efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- completing work and maintaining reports
- connecting and disconnecting components to radio equipment manufacturer requirements and appropriate engineering requirements
- correctly using an amateur radio in accordance with relevant industry standards and workplace procedures
- dealing with unplanned events in accordance with WHS/OHS and workplace procedures
- dismantling and assembling apparatus in accordance with manufacture guidelines
- following manufacturer service instructions for radio station assembly and dismantling, including transmitter, power, measurement and adjustment
- identifying and assembling amateur radio communication equipment
- maintaining an amateur radio communication station
- operating an amateur radio communication station
- preparing to operate an amateur radio communication station
- testing and measuring equipment
- testing and operating parameters of the station in accordance with workplace procedures and relevant industry standards
- using testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- amateur radio communication principles, operation and maintenance including:
  - amateur radio technical basics
  - interference and electromagnetic compatibility (EMC) overview
  - licence conditions
  - mathematics used for amateur radio operation
  - measurements
  - nature of amateur radio
  - operating practices and procedures overview
  - propagation overview
  - safety overview
  - transmission lines and antennas overview
  - transmitters and receivers
- problem-solving techniques
- relevant industry standards, including:
  - Standard Licence Operator's level as prescribed by the Australian Communication Media Authority (ACMA)
- relevant manufacturer specifications and operating instructions
- relevant radio spectrum regulations
- relevant resources, tools, apparatus and testing devices
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- relevant Australian and international standards for the assembly and operation of an amateur

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radio station

- resources that reflect current industry practices in relation to assembling, dismantling and operating an amateur radio station, including the assembly of an antenna, power supply unit or an equivalent circuit
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0047 Plan large electronic projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan large electronic projects.

It includes developing and documenting electronics project proposals, milestones and completions. It also includes establishing budgets; applying critical path analysis; developing workflow strategies; and documenting, presenting and negotiating budgets and timelines.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify electronic project requirements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Techniques for electronic project planning are reviewed are adopted in accordance with workplace procedures

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	1.3	Extent of the electronic project is determined from design brief specifications and/or other relevant documentation and from discussions with appropriate person/s
2 Develop electronic project plan proposal	**2.1**	Plant, material, labour and relevant costs are sought and obtained from relevant person/s in accordance with workplace policies and procedures
	2.2	Project budget is determined from estimated plant, material, labour and other costs in accordance with workplace policies and procedures
	2.3	Critical path analysis is applied to developing workflow strategies
	2.4	Sources and availability of physical materials and human resources needed for the project are determined in accordance with workplace policies and procedures
	2.5	Risk management strategies are sought and applied in the project plan
	2.6	Project plan is reviewed in accordance with all inputs and adjusted to rectify any anomalies
	2.7	Project plan proposal is documented in accordance with workplace policies and procedures
3 Obtain approval for project plan	**3.1**	Project plan is presented and discussed with relevant person/s
	3.2	Alterations to project plan resulting from the presentation/discussion are negotiated with relevant person/s in accordance with constraints of workplace policies
	3.3	Final project plan is documented and approval obtained from appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning an industry-accepted medium-sized electronic project must include at least the following attributes:

- budgets and timelines
- critical path analysis
- documentation
- plan presentation
- workflow strategies development

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH160A Plan large electronic projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0047 Plan large electronic projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the project requirements accurately
- establishing a project budget
- developing effective workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan successfully
- obtaining approval of the final plan
- dealing with unplanned events
- apply sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using of risk control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- large electronic project planning, including:
  - purpose of project planning
  - documents needed to plan a project
  - factors influencing sequence and restraints of project activities
- critical path analysis encompassing:
  - graphical representation methods
  - methods of representing time/rates
- customer/client relations, including:
  - purpose of critical path analysis
  - essential data
  - relational sequence of work activities

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    - graphical representation methods
    - methods of representing time/rates
    - monitoring methods
- electronic industry sector customs and practices, including:
    - technical aspects of project planning and management encompassing:
        - method of ensuring equipment meets specified performance requirements
        - performance/cost-benefit analysis
        - equipment procurement
    - typical approaches to planning and management
    - successful planning techniques
    - best practice management methods and styles
- WHS/OHS enterprise responsibilities, including:
    - provisions of relevant WHS/OHS legislation
    - principles and practice of effective WHS/OHS management
    - management arrangements relating to regulatory compliance
    - enterprise hazards and risks, control measures and relevant expertise required
    - characteristics and composition of workforce and their impact on WHS/OHS management
    - relevance of enterprise management systems to WHS/OHS management
    - analysis of working environment and design of appropriate WHS/OHS management systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
    - relevant risk mitigation processes
    - relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations

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- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to planning electronic projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0048 Program and commission commercial access control security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to program and commission commercial access control security systems.

It includes programming and testing of security access control system typically used in commercial buildings and premises. It also includes working safely, following specifications, programming security functions, communicating access control system information to the end user/s and providing 'as-programmed' documents.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

UEEEC0027 Enter instructions and test wired and wireless security systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to program commercial access control security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for commercial access control security system work
	1.3 Safety hazards not previously identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
	1.4 Extent of programming and commissioning is determined from reports, documentation and from discussions with relevant person/s
	1.5 Appropriate person/s is consulted to ensure commercial access control security system work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to program and commission systems are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Program and commission commercial access control security system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out commercial access control security system work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace

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		safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Security access control instructions and functions are entered into the system in accordance with design specifications
	2.5	Security access control devices are checked for correct location and alignment
	2.6	Security access controls are inspected and tested in accordance with commercial access control security system commissioning requirements
	2.7	Sources of access control anomalies are identified and corrected
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.10	Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report programming and commissioning activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Access control system operating documentation and explanation of system features is communicated to appropriate person/s
	3.4	‘As-installed’ security access control system is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Programming and commissioning must include at least the following:	• two different commercial security access control systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH155A Program and commission commercial access control security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0048 Program and commission commercial access control security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- communicating access control system to appropriate person/s
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting ‘as-installed’ system correctly
- entering system functions using relevant information technology
- identifying and correcting function anomalies
- testing access control functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- program loading methods, including relevant information technology
- program testing methods
- relevant job safety assessments or risk mitigation processes
- relevant security systems access control manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security systems access control programming
- vender programming codes and functions, including:
  - input/output (I/O) instructions
  - variables
  - timers

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- limitations of vender software.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to programming and commissioning commercial security access control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0049 Program and commission commercial security closed-circuit television systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to program and commission commercial security closed-circuit television (CCTV) systems.

It includes programming and testing security CCTV systems typically used in commercial buildings and premises It also includes working safely, following commercial security CCTV system specifications, programming security functions and schedules, and providing 'as-programmed' documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

UEEEC0027 Enter instructions and test wired and wireless security systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to program commercial security CCTV system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for commercial security CCTV system work
	1.3 Safety hazards not previously identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
	1.4 Extent of programming and commissioning is determined from reports, documentation and from discussions with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure commercial security CCTV system work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to program commercial security CCTV system are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Program and commission commercial security CCTV system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out commercial security CCTV system work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as

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		required, conducted within workplace safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Security CCTV functions are entered into the commercial security system in accordance with design specifications
	2.5	Security CCTV devices are checked for correct location and alignment
	2.6	Security CCTVs are inspected and tested in accordance with commissioning requirements
	2.7	Sources of CCTV anomalies are identified and corrected
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.10	Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report programming and commissioning activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	'As-installed' security CCTV system is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Programming and commissioning must include at least the following:

- two different commercial security CCTV systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH156A Program and commission commercial security closed-circuit television systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0049 Program and commission commercial security closed-circuit television systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting ‘as-installed’ system correctly
- entering system functions using relevant information technology
- identifying and correcting function anomalies
- testing closed-circuit television (CCTV) functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- program loading methods, including relevant information technology
- program testing methods
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security systems CCTV programming
- vender programming codes and functions, including:
  - input/output (I/O) instructions
  - variables
  - timers
  - limitations of vender software.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to programming and commissioning commercial security CCTV systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0050 Program and commission commercial security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to program and commission commercial security systems.

It includes programming and testing security alarm systems typically used in commercial buildings and premises It also includes working safely, following commercial security system specifications, programming security alarm functions and schedules, communicating alarm system information to end user/s and providing as-programmed documents.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

UEEEC0027 Enter instructions and test wired and wireless security systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to program commercial security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for commercial security system work
	1.3 Safety hazards not previously identified are risk assessed, documented and risk control measures devised and implemented in consultation with appropriate person/s
	1.4 Extent of programming and commissioning is determined from reports, documentation and from discussion with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure commercial security system work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to program commercial security systems are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Program and commission commercial security system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out commercial security system program work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS requirements and, as

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		required, conducted within workplace safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Security alarm functions and instructions are entered into the commercial security system in accordance with design specifications
	2.5	Security alarm devices are checked for correct location and alignment
	2.6	Security alarms are inspected and tested in accordance with commercial security system commissioning requirements
	2.7	Sources of alarm anomalies are identified and corrected
	2.8	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.9	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.10	Programming and commissioning activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report programming and commissioning activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Alarm system operating documentation and explanation of system features is communicated to appropriate person/s
	3.4	'As-installed' security alarm system is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Programming and commissioning must include at least the following:	• two different commercial security alarm systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH154A Program and commission commercial security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0050 Program and commission commercial security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- communicating system features to appropriate person/s
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting ‘as-installed’ system correctly
- entering security system functions using relevant information technology
- identifying and correcting function anomalies
- testing system functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- program loading methods, including relevant information technology
- program testing methods
- relevant job safety assessments or risk mitigation processes
- relevant security system manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- security systems alarm programming
- vender programming codes and functions, including:
  - input/output (I/O) instructions
  - variables
  - timers

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- limitations of vender software.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to programming and commissioning commercial security alarm systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0051 Program and commission commercial video/audio systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to program and commission commercial video/audio systems.

It includes preparing to commission commercial video/audio systems, commissioning commercial video/audio systems, and completing and reporting on commissioning activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

UEEEC0040 Install commercial video/audio system components

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission commercial video/audio systems	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Extent of programming and commissioning is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.6 Tools, equipment and testing devices required to program and commission video/audio systems are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Commission commercial video/audio systems	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures

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	2.4	Audio/video devices are checked for correct location and alignment in accordance with workplace procedures and job specifications
	2.5	Functional settings are made for each audio/video apparatus in accordance with design specifications
	2.6	Audio/video system functions are tested in accordance with commissioning requirements
	2.7	Sources of audio/video system anomalies are identified and corrected
	2.8	Decisions for dealing with unexpected situations are made based on job specifications, work requirements and discussions with relevant person/s
	2.9	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.10	Commissioning activities are carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report commissioning activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning commercial audio/video systems must include at least the following:	• two different commercial audio/video systems

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH137A Program and commission commercial video/audio systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0051 Program and commission commercial video/audio systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- setting apparatus functions
- testing system functions
- identifying and correcting function anomalies
- documenting ‘as-installed’ system correctly
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- determining scope of work
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial video/audio programming and commissioning, safe working practices and relevant standards, codes and regulations, including:
  - purpose of commissioning
  - commissioning planning and documentation
  - initial tests and adjustments
  - commissioning procedures and documentation
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation

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processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to programming and commissioning commercial audio/video systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0052 Program and test large security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to program and test large security systems.

It includes programming functions and testing electronic security system with over 50 connected devices in buildings, premises and precincts. It also includes working safely, programming and adjusting security devices, system testing and following written and oral instructions and procedures.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0003 Assemble and set up basic security systems

UEEEC0050 Program and commission commercial security systems

UEEEC0048 Program and commission commercial access control security systems

UEEEC0049 Program and commission commercial security closed-circuit television systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to program and test large security system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures are followed in preparation for electronic security system work
	1.3 Safety hazards not previously identified are risk assessed, reported and advice on risk control measures sought from work supervisor
	1.4 Nature and location of electronic security system work is obtained from work supervisor or other appropriate person/s to determine the scope of work to be undertaken
	1.5 Advice is sought from work supervisor or other appropriate person/s to ensure electronic security system work is coordinated effectively with others
	1.6 Sources of materials required for electronic security system work are established in accordance with workplace procedure
	1.7 Tools, equipment and testing devices needed to carry out security system work are obtained and checked for correct operation and safety
2 Program and test large wired and wireless security system	**2.1** WHS/OHS risk control measures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and

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		workplace procedures
	2.3	Security devices are checked for correct location and alignment
	2.4	Security function codes are entered into the electronic security system in accordance with manufacturer instructions
	2.5	Security system is inspected and tested in accordance with manufacturer instructions
	2.6	Security system operational defects are identified and corrected
	2.7	Unplanned situations are responded to in accordance with workplace procedures and the approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.8	Security programming and testing is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Complete and document security system programming and testing	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Security system is documented in accordance with regulatory requirement and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Security systems must have controllers and more than 50 connected devices of five different types and include at least the following:

- programming and testing of large wired and wireless security systems on two large security systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH153A Program and test large security systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0052 Program and test large security systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- entering system instructions
- testing system functions
- identifying and correcting operational malfunctions
- documenting ‘as-installed’ system correctly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- security systems programming methods, including:
  - vender programming codes and functions encompassing:
    - input/output (I/O) instruction
    - variable
    - timers
    - limitations of vender software
  - program loading methods using a personal computer (PC)
  - program testing methods
  - relevant manufacturer specifications
  - relevant job safety assessments or risk mitigation processes
  - relevant WHS/OHS legislated requirements
  - relevant workplace documentation
  - relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to programming and testing large wired and wireless security systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0053 Provide engineering solutions to air traffic control system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide engineering solutions to air traffic control (ATC) system problems in compliance with relevant regulatory requirements of the Civil Aviation Safety Authority (CASA) and national operating standards.

It includes determining and providing solutions to ATC system by interpreting diagrams, using effective problem-solving techniques and reporting work activities and outcomes.

Typical systems could be air traffic management (ATM), voice switching and control system (VSCS), data and communications networks, aeronautical fixed telecommunications network (AFTN), control maintenance monitoring (CMM), operational display suite (ODS), air situation display (ASD), tower situational awareness display (TSAD), aeronautical reference data display and distribution system (ARDDDS), backup to the above systems, buildings and services and navigational aids.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Determine solutions to ATC system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given aviation work area are identified and applied
	1.2 Aviation operational safety procedures for a given work area are obtained and applied
	1.3 WHS/OHS risk control measures and workplace procedures are followed in preparation for aviation work activity
	1.4 Extent of problems within the ATC system are determined from diagrams, performance specifications and situation reports, and in consultation with relevant person/s
	1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work
	1.6 Tools, equipment and testing devices needed are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Provide solutions to problems within ATC system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 ATC system operation, characteristics and applications are applied to developing engineering solutions to aviation control problems
	2.3 Parameters, specifications and performance requirements in relation to ATC system problems are obtained in accordance with workplace procedures
	2.4 Approaches to resolving ATC system problems are evaluated to provide most effective solution/s
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6 Problems are solved efficiently without waste of materials or damage to apparatus, the surrounding environment or aviation services using sustainable energy practices

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3	**Inspect, test and document solution to problems within ATC system**	**3.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		3.2 Engineering solutions to ATC system problems are tested to determine their effectiveness and modified, as required
		3.3 Adopted solutions are documented, including instructions for implementation, that incorporates risk control measures to be followed
		3.4 Justification for solutions used to solve ATC system problems are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing solutions to ATC system problems must include at least four of the following:	• aeronautical fixed telecommunications network (AFTN) • aeronautical reference data display and distribution system (ARDDDS) • air situation display (ASD) • air traffic management (ATM) • control maintenance monitoring (CMM) • data and communications networks • operational display suite (ODS) • tower situational awareness display (TSAD) • voice switching and control system (VSCS) • backup to the above systems • buildings and services and navigational aids

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH190A Provide engineering solutions to air traffic control system problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0053 Provide engineering solutions to air traffic control system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the air traffic control (ATC) system problem
- obtaining air traffic control systems specifications and performance requirements appropriate to each problem
- testing and solutions to ATC system problems
- documenting justification of solutions implemented in accordance with established procedures
- dealing with unplanned events
- applying sustainable energy principles and practices
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- providing engineering solutions to ATC systems problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ATC systems technology, including:
  - regulatory bodies encompassing:
    - structure and function of each of the regulatory bodies:
  - International Civil Aviation Organisation (ICAO)
  - Australian Transport Safety Bureau (ATSB)
  - Civil Aviation Safety Authority (CASA)
  - standards and recommended practices issued by the regulatory bodies
  - relationship between the regulatory bodies and a provider of air traffic services
  - air traffic services encompassing:

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  - services provided by air traffic services
  - objectives of air traffic services
- ATC awareness encompassing:
  - process of maintaining an orderly flow of air traffic
  - different states of an aircraft flight
  - need and purpose of flight data regions
  - enroute airspace and sectors
  - airspace and sectors around ATC facilities
  - instructions and information exchanged between controllers and pilots
  - information exchanged between air traffic controllers
- the components of an ATC system encompassing:
  - air traffic management (ATM), voice switching and control system (VSCS), data and communications networks, aeronautical fixed telecommunications network (AFTN), control maintenance monitoring (CMM), and buildings and services
  - purpose and function of each of the components of an ATC system
- inputs to the ATM system encompassing:
  - messages and information received by the ATM system such as surveillance, time, metrological, flight plans and controller input
- ATM system architecture encompassing:
  - the various hardware configuration items (HWCI)
  - operating system and other layers of software installed on the ATM system
  - basic block diagram of the ATM system indicating the network topology, data processing sub-system and data presentation processing
  - requirement for redundancy and the master/slave relationship
  - the different partitions, connections and dependencies within the ATM system
  - functions that can be performed from the control maintenance and monitoring workstation
- outputs from the ATM system encompassing:
  - the operation display suites (ODS) and positions where they are used
  - block diagram of the display suites indicating peripherals and connections
  - different aircraft tracks generated by the ATM system
  - other information shown on an air situation display (ASD)
  - requirement for and use of the recording and playback facility
  - block diagram of the recording and playback facilities showing media devices and connections to the replay position
  - requirement for and use of the trace collection facility
  - block diagram of the trace collection facility showing media devices
  - data and information provided to other systems by the ATM system
- the fallback system for ATM encompassing:
  - purpose of the ultimate fallback (UFB) system
  - block diagram of UFB indicating peripherals and connections

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    - operating system and application software installed on the UFB computers
    - information used by UFB
    - how the information is presented to the air traffic controllers
    - actions required by an air traffic controller to access UFB system
- VSCS encompassing:
    - purpose of the VSCS
    - top level block diagram of the VSCS
    - top level operation and protocols used by the VSCS
    - various VSCS interfaces and functionality they provide
    - basic operation of an air-to-ground communication facility
    - need for and basic operation of air-to-ground retransmission
    - requirement for and use of the audio recording and replay facility
    - block diagram of the audio recording and replay facilities showing the media access devices and connection to the VSCS
    - functionality provided by the system management system (SMS)
- fallback for the VSCS encompassing:
    - purpose and functionality provided by the air ground air (AGA) bypass facility
    - purpose and functionality provided by the ground ground (GG) bypass facility
    - block diagram of the VSCS and AGA bypass connections
    - block diagram of the VSCS and GG bypass connections
    - how an air traffic controller would access the AGA or GG bypass facility if required
- data and communication networks encompassing:
    - purpose and primary use of the networks used by the ATC system
    - systems and end users of each of the networks
    - block diagram to show the high-level architecture of each of the networks
    - function of the networking devices used by the networks
    - technologies and protocols used by the networks
- AFTN encompassing:
    - function of the AFTN
    - structure and type of message carried by the traditional AFTN
    - type of messages that can be distributed by more contemporary message systems
    - services provided by contemporary message systems
    - basic block diagram of a contemporary message system
- buildings and services encompassing:
    - building layout and format of an ATC centre
    - building layout and format of an ATC tower
    - services required to support an ATC centre
    - block diagram of the ATC centre electrical power system, including main power, standby generator, uninterrupted power supply (UPS), batteries and switching equipment

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    - block diagram of the ATC centre air conditioning system, including the major components and the primary and secondary loops
    - basic flow chart to show the interaction between the fire system and other services in the ATC centre
    - physical security requirements of an ATC centre
    - components and operation of the security system used in an ATC centre
- tower situational awareness display (TSAD) encompassing:
    - need for and functionality provided by the TSAD system
    - block diagram of a TSAD installation
    - the source of and the information used by the TSAD system
    - operating system and application software installed on the TSAD computers
- aeronautical reference data display and distribution system (ARDDDS) encompassing:
    - functionality provided by ARDDDS
    - block diagram of an ARDDDS installation
    - information used by the ARDDDS
    - operating system and application software installed on the ARDDDS computers
- navigational aids encompassing:
    - purpose and functionality provided the navigational aids
    - location of navigational aids
    - basic principle of operation of the navigational aids
- relevant air control system manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant CASA national operating standards, and workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- resources that reflect current industry practices in relation to providing solutions to ATC systems problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0054 Provide gate array solutions for complex electronics systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and develop electronic systems using gate array technology.

It includes working safely, following gate array design brief and interpreting device specifications, using appropriate development software, testing operation and verifying compliance of the of the design against the final brief, and documenting design and development work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design gate array system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.2	Operational safety procedures for a given work area are obtained and understood
	1.3	Extent of the proposed gate array system design and circuit development is determined from design brief or in consultation with appropriate person/s
	1.4	Design and circuit development work is planned to meet scheduled timelines in consultation with others involved
	1.5	Materials and devices/components required for the design work are selected on compatibility of their specifications with system requirements and project budget constraints
	1.6	Tools, equipment, software and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Design and develop circuit gate array system	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the design work are followed
	2.2	Gate array system and industry compliance standards are applied to the design
	2.3	Alternative arrangements for the design and circuit development are considered in accordance with the requirements outlined in the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design
	2.5	Circuit device and circuits are constructed and tested for compliance with the design brief and regulatory requirements
	2.6	Circuit malfunctions are rectified and retested to ensure effective operation with the design
	2.7	Gate array system design and development is documented for submission to appropriate person/s for approval
	2.8	Solutions to unplanned situations are provided in accordance with workplace policies
3 Obtain approval for design and circuit	**3.1**	Gate array system design is presented and explained to client representative and/or relevant person/s

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development of gate array system and documentation	
	3.2 Requests for design modifications are negotiated with relevant person/s within the constraints of workplace policies
	3.3 Final design and circuit development are documented and approval obtained from appropriate person/s
	3.4 Quality of work is monitored against design brief, performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and developing a gate array system must include at least the following:	• three input/output (I/O) devices or functions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH189A Provide Gate Array solutions for complex electronics systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0054 Provide gate array solutions for complex electronics systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- constructing, inspecting and testing circuit gate array device and circuits in accordance with design brief and regulatory requirements
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- designing gate array system in accordance with workplace procedures
- developing outlines of alternative designs and comparing advantages and disadvantages on each
- developing the gate array design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- negotiating design alteration requests and obtaining approval for final gate array design system
- verifying compliance of the design against the final brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- gate array fundamentals
- hardware design language
- programmable logic device (PLD), including:
  - types of PLDs
  - features of complex programmable logic device (CPLD) devices
  - features of field programmable gate array (FPGA) devices
  - input/output (I/O) logic family assignment for FPGA

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing and developing gate array systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0055 Repair basic computer equipment faults by replacement of modules/sub-assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair computer equipment by replacement of slot/plug connected modules/sub-assemblies.

It includes planning and repairing computer equipment and completing workplace reporting requirements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

AND

UEECD0043 Solve problems in direct current circuits

OR

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

OR

UEECD0040 Solve basic problems electronic and digital equipment and circuits

UEECD0043 Solve problems in direct current circuits

OR

UEECD0040 Solve basic problems electronic and digital equipment and circuits

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair computer equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Nature of the repair is obtained from documentation or supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, apparatus and testing devices needed to carry out work are obtained and checked for correct operation in accordance with workplace procedures and safe work practices
2 Repair computer equipment	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out computer repair work are followed
	2.2 Need to inspect, test and measure live electrical work is determined in accordance with WHS/OHS requirements, safe work practices and workplace procedures
	2.3 Circuits/apparatus are checked and isolated in accordance with WHS/OHS requirements and

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		workplace procedures
	2.4	Apparatus is dismantled in accordance with manufacturer guidelines and supervisor's instructions
	2.5	Modules/sub-assemblies are tagged during the dismantling for correct and efficient reassembly and stored to protect components against loss or damage
	2.6	Repairs are undertaken without damage to other components, apparatus or circuits
	2.7	Apparatus is assembled in an appropriate sequence with all modules/sub-assemblies and parts correctly placed, secured and connected in accordance with manufacturer guidelines and industry standards
	2.8	Unplanned events are referred to supervisor for directions in accordance with workplace procedures
	2.9	Repairs are carried out efficiently without waste of materials, damage to apparatus or environment using sustainable energy practices
3 Complete and report repair work activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Computer equipment is inspected, prepared and forwarded to appropriate person/s for testing
	3.3	Work area is cleaned and made safe in accordance with workplace procedures
	3.4	Work supervisor is notified of the completion of the repair work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Carrying out repairs to computers and servers must include the following:	• replacement of at least three slot/plug connected modules/sub-assemblies having different functions and in which the fault has been previously established

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH101A Repair basic computer equipment faults by replacement of modules/sub-assemblies.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0055 Repair basic computer equipment faults by replacement of modules/sub-assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least three separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- communicating effectively
- completing report repair work activities
- connecting computer to a network
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- following computer repair procedures, including control measures for static electricity
- preparing and repairing computer equipment, including:
  - detecting faulty components
  - reassembling the computer equipment correctly
  - repairing computers without damage to other equipment, environment and services
  - replacing modules/sub-assemblies to manufacturer guidelines
  - testing computer equipment operation, including repaired faulty components
  - using components, apparatus or circuits
- reading and interpreting system specifications and workplace procedures
- using operating system tools to configure a peripheral.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- personal computers structure and components and their function, including motherboards, memory modules, video modules, connecting buses, storage devices and the like
- personal computers assembling and dismantling techniques
- personal computers hardware faults

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- basic network hardware and components
- connection of network media
- set-up of standard network configuration, including:
  - cable anchoring and support methods
  - termination methods
- basic repairs to computer equipment by replacing modules/sub-assemblies
- basic set-up of network configuration including hardware and components
- problem-solving techniques
- relevant computer structure and components repairs, including:
  - computer assembly and dismantle techniques
  - computer system inspection and testing techniques
  - static electricity control measures
  - three slot/plug connected modules/sub-assemblies, including:
    - modules, including self-contained hardware components, such as motherboards, memory cards, video modules, connecting buses and storage devices
    - sub-assemblies, including collections of integrated components that may form part of a module that are designed to be replaceable for servicing, such as the component part of a hard drive module or motherboard
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instruction for tools, equipment, components, apparatus and circuits
- relevant testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions, including repair and quality workplace procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0056 Repair predictable faults in audio components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair predictable faults in audio components.

It includes preparing to repair audio components, finding and repairing faults, and completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0028 Fault find and repair complex power supplies

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair audio components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the fault is obtained from documentation or from relevant person/s to determine scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is approached methodically applying principles of audio components and circuits using measured and calculated values of apparatus parameters and/or with reference to manufacturer service manuals
	2.5 Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6 Faulty components are rechecked and their fault status confirmed
	2.7 Repairs are made in accordance with manufacturer instructions and approval of relevant person/s

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	2.8	Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.10	Repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is provided in the required format for repairs to apparatus
	3.4	Reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Repairing faults in audio components must include at least the following:	• two different audio components each with any two predictable faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH124A Repair predictable faults in audio components.

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Assessment Requirements for UEEEC0056 Repair predictable faults in audio components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- efficiently finding faults
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- audio component functional controls
- audio component repair basics
- audio reproduction and electronic components
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures
- technical manuals and catalogues.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to carrying out repairs of predictable faults in audio components
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0057 Repair predictable faults in general electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair predictable faults in general electronic apparatus.

It includes preparing to repair electronic apparatus, finding and repairing faults, and completing and reporting on repair activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0028 Fault find and repair complex power supplies

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to repair electronic apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the fault is obtained from documentation or relevant person/s to determine scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is undertaken methodically applying electronic apparatus and circuit principles using measured and calculated values of apparatus parameters in accordance with manufacturer instructions, including block and schematic diagrams
	2.5 Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6 Faulty components are rechecked and their fault status confirmed
	2.7 Repairs are undertaken in accordance with manufacturer instructions and instructions from relevant person/s
	2.8 Apparatus is reassembled and tested for safety and

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		functionality in preparation for return to the customer
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.10	Repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair activities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is provided for repairs to apparatus in the required format
	3.4	Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out repairs of predictable faults must include at least the following:	• two different general electronic apparatus for a given representative range, examples of which include:
	  • data capture devices
	  • security panels
	  • fire protection panels
	  • industrial control apparatus
	  • instrumentation electronics

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH107A Repair predictable faults in general electronic apparatus.

Links

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Assessment Requirements for UEEEC0057 Repair predictable faults in general electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- finding faults efficiently
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- carrying out repairs of predictable faults in general electronic apparatus, including:
  - general electronic apparatus fault finding and repair:
    - block and schematic diagram sub-system components (i.e. functional blocks) and their operating parameters
    - common faults, their symptoms and cause
    - fault location procedures and testing points
    - component repair/replacement

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    - device adjustments
  - technical manuals and catalogues:
    - how to read and apply information
    - typical format
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant industry standards, codes and regulations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to carrying out repairs of predictable faults in general electronic apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0058 Repair predictable faults in television receivers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair predictable faults in television receivers.

It includes preparing to repair televisions, finding and repairing faults, completing and reporting on repair activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0075 Troubleshoot single phase input d.c power supplies

UEEEC0069 Troubleshoot digital sub-systems

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

UEEEC0028 Fault find and repair complex power supplies

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair televisions	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the fault is obtained from documentation or from relevant person/s to determine scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** Workplace risk control measures and workplace procedures are applied
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is checked and isolated as required in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is undertaken methodically applying principles of televisions and circuits using measured and calculated values of apparatus parameters in accordance with manufacturer instructions and workplace procedures
	2.5 Apparatus components are dismantled, where necessary, and parts stored to protect against loss or damage
	2.6 Faulty components are rechecked and their fault status confirmed
	2.7 Repairs are undertaken in accordance with manufacturer instructions and relevant person/s instructions

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	2.8	Apparatus is reassembled and tested for safety and functionality in preparation for return to the customer
	2.9	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.10	Repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification is provided for repairs to apparatus in the required format
	3.4	Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Repairing faults in television receivers must include at least the following:	• two predictable faults in cathode ray tube (CRT) television receivers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH119A Repair predictable faults in television receivers.

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Links

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Assessment Requirements for UEEEC0058 Repair predictable faults in television receivers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- efficiently finding faults
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the repairs
- replacing components without damage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- technical manuals and catalogues

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- television chrominance and luminance
- television fundamentals
- television receiver repair basics
- television scanning and deflection.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to carrying out repairs of predictable faults in television receivers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0059 Repair routine business equipment faults

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair routine business equipment faults. It includes preparing to repair business equipment, repairing business equipment, and completing and reporting on repair work activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair business equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied

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	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Nature of the repair is obtained from documentation or from relevant person/s to determine the scope of work
	1.4	Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.5	Materials required for the work are determined in accordance with workplace procedures
	1.6	Tools, apparatus and testing devices required for work are obtained and checked for correct operation and safety
2 Repair business equipment	**2.1**	Workplace risk control measures and procedures are applied
	2.2	The need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/equipment are isolated, where necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Predictable faults are confirmed in accordance with testing procedures
	2.5	Apparatus is dismantled in accordance with manufacturer service guides and instructions from relevant person/s
	2.6	Component parts are tagged and stored during dismantling to protect against damage and loss and to ensure correct and efficient reassembly
	2.7	Repairs are made in accordance with manufacturer service guides and instructions from relevant person/s
	2.8	Apparatus is assembled in correct sequence with all components parts placed, secured and connected in accordance with manufacturer guides or industry practice
	2.9	Repaired equipment is tested in accordance with workplace procedures to verify it functions correctly

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	2.10 Unplanned events are reported to relevant person/s in accordance with workplace procedures
	2.11 Repairs are conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete and report repair work activities	**3.1** Workplace risk control measures and workplace procedures are applied
	3.2 Work area is cleaned and made safe in accordance with workplace procedures
	3.3 Equipment is placed into service and relevant person/s notified of repair work completion in accordance with workplace procedures
	3.4 Relevant reporting is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out routine repairs to business equipment must include at least the following:	• confirming at least two predictable faults in low volume (up to 40 ppm) different types of equipment • following routine procedures to repair faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH103A Repair routine business equipment faults.

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Links

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Assessment Requirements for UEEEC0059 Repair routine business equipment faults

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- accurately completing service reporting
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- carrying out routine repairs to business equipment
- coordinating work with relevant person/s
- correctly dismantling and reassembling business equipment
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- determining scope of repair work
- following service instructions to access components
- following service instructions to confirm reported fault
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system
- removing and replacing electrical/electronic components
- removing and replacing mechanical components
- testing equipment operation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- component replacement and repair
- electromechanics of business machines
- electronic cable and conductor terminations
- fault finding tables, charts and procedures

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- operational concepts of business machines
- relevant business equipment software
- relevant testing procedures
- relevant manufacturer specifications and service guides
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- workplace communication methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to carrying out routine repairs to business equipment.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to replace electronic components, cabling and sub-systems of electronic apparatus.

It includes safe working practices, testing, dismantling and assembling apparatus, using equipment and tools correctly (including soldering equipment) and disconnecting and reconnecting components to repair electronic apparatus faults.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair electronic apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.2	Hazards are identified, risks are assessed and control measures and workplace procedures are implemented
	1.3	Nature of the repair is obtained from relevant documentation or work supervisor to determine the scope of work to be undertaken
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for work are obtained in accordance with workplace procedures
	1.6	Tools, apparatus, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Repair electronic apparatus	**2.1**	WHS/OHS risk control measures and workplace procedures are followed
	2.2	Need to inspect, test or measure live work is determined and conducted in accordance with WHS/OHS workplace procedures and regulatory requirements
	2.3	Circuits/apparatus are checked as being isolated as required in accordance with WHS/OHS workplace procedures and regulatory requirements
	2.4	Apparatus is dismantled in accordance with manufacturer specifications and supervisor instructions
	2.5	Apparatus component parts are correctly tagged during dismantling to ensure correct and efficient reassembly and stored to protect against loss or damage in accordance with workplace procedures
	2.6	Repairs are conducted using the correct tools/soldering equipment and without damage to other components, sub-systems, apparatus or circuits in accordance with workplace procedures, industry standards and regulatory requirements
	2.7	Apparatus is re-assembled in correct sequence, with all components and parts replaced, secured and connected in accordance with manufacturer specifications, industry standards and workplace procedures
	2.8	Unplanned events are referred to supervisor for

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		directions in accordance with workplace procedures
	2.9	Apparatus repairs are completed without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report repair work activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Repaired apparatus is inspected, prepared in accordance with workplace procedures and forwarded to relevant person/s for testing
	3.3	Work area is cleaned and made safe in accordance with workplace procedures
	3.4	Work supervisor is notified of the completion of the repair work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Repairing basic electronic apparatus faults must be demonstrated in relation to:	• carrying out repair on electronic apparatus, limited to replacement or repair of components, including sub-systems in which the fault has been previously established
Repairs must include at least two of the following:	• a cable to be correctly terminated using a solderless termination technique • soldering and de-soldering

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH102A Repairs basic electronic apparatus faults by replacement of components.

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Assessment Requirements for UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - using risk control measures
  - checking tools, equipment and testing devices for correct operation and safety
  - checking circuits/apparatus are isolated
- carry out basic repairs to electronic apparatus, including:
  - following work instructions and manufacturer instructions for access to components
  - removing at least three different types of components specified in the work instructions
  - replacing components to manufacturer specifications
  - terminating electronic cables using solderless termination techniques
  - de-soldering and soldering without damage to components
  - reassembling the apparatus correctly
  - dealing with unplanned events in accordance with workplace procedures
- communicating effectively with others
- completing and reporting repair work activities
- complying with relevant electrical regulations and industry standards
- consulting work supervisor as required
- maintaining a clean worksite and equipment
- reading, interpreting and completing workplace documentation
- reassembling the apparatus correctly
- correctly tagging, inspecting and storing components during dismantling.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic soldering equipment and techniques, including:
  - workshop hazards and safety associated with soldering
  - quality concepts
  - electronic soldering equipment
  - the soldering process
  - lead-free solder
- printed circuit board soldering techniques, including:
  - electronic component mounting
  - solder rework of printed circuit boards
  - faulty solder joints
- soldering electronic cables, including:
  - effects and prevention of electrostatic discharge (ESD)
- electronic component basics, including:
  - types of components
  - the physical features and primary characteristic of components
  - marking and codes on components
  - handling static sensitive components
- electronic cable overview and coaxial cable, including:
  - coaxial cables types and characteristics
  - coaxial cable termination
- performance copper cables, including:
  - twisted pair voice and data cables
  - insulation displacement connector
  - colour codes
  - terminating performance cables
- electronic apparatus components, including:
  - fault finding
  - testing
  - replacement
- relevant electronic cables, electronic apparatus and components, including:
  - fault-finding techniques
  - safe storage of dismantled components and parts
  - techniques to dismantle and re-assemble
  - techniques to safely and correctly identify, replace and repair
  - techniques to tag components during dismantling process
- relevant electrical regulations, industry standards and codes of practice
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements

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- relevant work instructions
- relevant workplace documentation
- relevant workplace policies and procedures
- risk mitigation processes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0061 Set up and adjust commercial radio frequency (RF) transmission and reception systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and adjust commercial radio frequency (RF) transmission and reception systems for optimum performance. It includes preparing for, setting up and adjusting commercial RF transmission and reception systems, signal testing and analysis, and completing reports on set-up and adjustment activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0063 Solve fundamental electronic communications system problems

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

AND

UEECD0043 Solve problems in direct current circuits

OR

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up and adjust commercial RF transmission and reception systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.5 Measurement parameters are identified by reviewing transmission/reception requirements and manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures and relevant industry standards
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
2 Set up and adjust commercial RF transmission and reception systems	**2.1** Workplace risk control measures and procedures are applied
	2.2 Testing/measuring devices are connected and set up in accordance with requirements for relevant control system

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	2.3	Measuring instruments are set up and adjusted in accordance with transmission/reception requirements and manufacturer instructions
	2.4	Measurement results are analysed to determine the type and nature of adjustments required in accordance with relevant industry standards and job specifications
	2.5	Adjustments are made to provide optimum transmission/reception performance in accordance with relevant industry standards
	2.6	Decisions for dealing with unexpected situations are made from discussions with relevant person/s in accordance with relevant industry standards and job specifications
	2.7	Methods for dealing with unexpected situations are selected on the basis of safety, specified outcomes and workplace procedures
	2.8	Setting-up is conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy principles
3 Complete and report set-up and adjustment activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are recorded and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Setting-up and adjusting commercial radio frequency (RF) transmission and reception systems must include at least the following

- two different types of commercial radio RF transmission and reception systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH127A Set up and adjust commercial radio frequency (RF) transmission and reception systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0061 Set up and adjust commercial radio frequency (RF) transmission and reception systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- demonstrating signal testing and signal analysis
- demonstrating the making of relevant adjustments
- determining live testing/measurement requirements
- identifying and accessing materials, tools, apparatus and testing devices
- identifying measurement parameters
- isolating circuits/machines/systems
- recording adjustment settings in accordance with workplace procedures
- selecting and terminating correct connectors to coaxial cable
- selecting and using appropriate test equipment to make measurements
- setting up and adjusting in accordance with transmission/reception requirements and manufacturer instructions
- using measurement results to inform system adjustments.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- advanced electronic radio frequency (RF) testing and measuring devices and techniques
- antenna fundamentals, including selection and location of receiving and transmitting antennas, and test techniques

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- antenna system measurements, including standing wave ratio (SWR), return loss and reflection coefficient
- antenna types, features and characteristics, including reciprocity, impedance matching, polarisation, gain, directivity and bandwidth
- calculation of path loss and received power
- electronic communications fundamentals
- fundamentals of cavity filters, ferrite isolators and their application to multiple-transmitter or multiple-receiver systems
- fundamentals of half-wave dipole and quarter-wave ground plane antennas
- impedance calculations, including the use of Smith charts
- impedance matching techniques, including the use of resonant lines, including ¼ wave stubs
- notion of decibel ratio (dB), including relative measurements (dBr), dB referenced to power (dBm) and voltage (dBuV) measurements
- radio wave propagation characteristics and modes of propagation in free space, including multiple-path effects
- relevant industry standards, codes and regulations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- RF connector fundamentals and common types
- RF measurement techniques, including time and frequency domain measurements
- transmission line fundamentals, including characteristic impedance (Zo) line velocity, impedance matching, loss characteristics, line and waveguide types and line test/measurement techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- resources that reflect current industry practices in relation to commissioning commercial RF transmission and reception systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0062 Set up and test residential video/audio equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and test residential video/audio equipment.

It includes preparing to set up audio/video equipment, setting up audio/video equipment, completing system set-up and reporting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up audio/video equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures and are applied in accordance with workplace procedures prior to commencing work

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	1.3	Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4	System details are obtained from purchase documentation or relevant person/s to determine scope of work
	1.5	Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.6	Materials required for work are obtained and checked in accordance with workplace procedures
	1.7	Tools and testing devices required for work are obtained and checked for correct operation and safety
2 Set up audio/video equipment	**2.1**	Workplace risk control measures and workplace procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/components are isolated, where necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4	System components are unpacked, checked for damage and meet requirements for scope of work
	2.5	System components are placed for optimum performance within constrains imposed by the area and customer
	2.6	Systems components are connected in accordance with manufacturer instructions
	2.7	System functions are set to customer's requirements and tested for correct operation
	2.8	Unplanned events are reported to relevant person/s in accordance with workplace procedures
	2.9	System set-up is conducted efficiently without waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete system set-up	**3.1**	Workplace risk control measures and workplace

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and report		procedures are applied
	3.2	Work area is cleaned and made safe in accordance with workplace routines
	3.3	System/component documentation is handed over to the customer
	3.4	Relevant person/s is notified of work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and testing residential audio/video equipment must include at least the following:	• an audio system consisting of at least two speakers, with two different audio sources and a preamplifier/power amplifier; or an integrated amplifier/tuner/player • an audio/video system consisting of television receiver, 5-channel amplifier, five speakers and an audio/video player

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH104A Set up and test residential video/audio equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0062 Set up and test residential video/audio equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing relevant documentation and handing over to the customer
- connecting components in accordance with manufacturer instructions
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system
- placing components for optimum performance within constrains imposed by the area and customer
- setting functional controls in accordance with customer’s requirements
- testing functional operation
- unpacking and checking system components against purchase documents and manufacturer content list.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- residential video/audio equipment, including:
  - audio and video component functional controls
  - audio and video component set-up
  - audio and video component testing
  - cable and conductor types, characteristics and installation
  - component connection options and arrangements
  - electronic cable and conductor termination methods
  - electronic safe working practices
  - types of audio and video components.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to setting up and testing residential audio/video equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0063 Solve fundamental electronic communications system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve fundamental electronic communications system problems.

It includes ascertaining correct operation of communications system and solving fundamental system problems as met in engineering support work functions. It also includes working safely, applying problem-solving techniques, using a range of measuring devices, and providing solutions derived from measurements to predictable problems in an electronic communications system.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to solve fundamental problems in electronic communications system**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
		1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for electronic communications system work
		1.3 Safety hazards not previously identified are risk assessed, noted on job safety assessments and established risk control measures implemented
		1.4 Nature of the communications system problem is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
		1.5 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
		1.6 Tools, testing devices and materials needed to carry out the electronic work are obtained and checked for correct operation and safety
2	**Solve fundamental problems in electronic communications system**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the electronic work are followed
		2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace safety procedures
		2.3 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4 Fundamental of communication system characteristics, components and transmission media is applied to resolving system problem/s
		2.5 Logical approaches are used to solve system problems from measured and calculated values as they apply to communication system configuration
		2.6 Unplanned situations are dealt with safely and with the approval of authorised person/s in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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	2.7	Electronic problems are resolved without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete electronic work and document problem-solving activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Reports are written outlining electronic system problem and justifying solutions used

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH146A Solve fundamental electronic communications system problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0063 Solve fundamental electronic communications system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying fundamental knowledge of communication system characteristics, components and transmission media to resolving system problems
- applying measured values in verifying system operation and determining any corrective actions required
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- providing written justification for solutions used
- solving predictable system problems
- using logical and methodical approaches to solving system problems
- using test equipment to measure communication system parameters and modulated signal characteristics.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- analogue and digital modulation applications
- communications system principles
- notion and application of the decibel ratio (dB)
- optical communications system elements and transmission media characteristics
- principles of amplitude based (AM), frequency based (FM) and phase based (PM) modulation
- radio spectrum fundamentals, including signal and noise considerations
- radio frequency (RF) communications system elements and basic antenna principles
- relevant manufacturer specifications

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedure
- safety considerations for optical and RF communications systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to solving fundamental problems in electronic communications systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0064 Solve oscillator problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve oscillator problems.

It includes preparing to work on oscillator sections, solving oscillator section problems, completing work and reporting problem-solving activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on oscillator sections	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied

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	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Nature of oscillator problems is obtained from documentation or relevant person/s to determine the scope of work
	1.4	Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5	Materials required for work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Solve oscillator section problems	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Appropriate methods are used to solve problems from measured and calculated values as they apply to oscillator sections in an electronic apparatus
	2.5	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.6	Problems are solved without unnecessary damage to apparatus circuits, the surrounding environment or services applying sustainable energy practices
3 Complete work and report problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve circuit problems is reported in accordance with workplace procedures and job specifications

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3.4	Work completion reporting is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving oscillator problems must include at least the following:	• three problems in typical oscillator sections of electronic apparatus

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH142A Solve oscillator problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0064 Solve oscillator problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- coordinating work with relevant person/s
- correctly and accurately calculating parameters
- correctly and accurately taking measurements
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/systems
- providing justification for the solutions to problems
- providing solution to oscillator component/circuit problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- oscillator problem solving, including:
  - relevant industry standards, codes and regulations
  - requirements for oscillation
  - Wien bridge oscillators
  - phase shift oscillators
  - Colpitts oscillators and Hartley oscillators
  - crystal oscillators

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  - astable oscillators
  - 555 timer circuit and applications
  - voltage-controlled oscillator (VCO) circuits
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to troubleshooting oscillators
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0065 Solve problems in basic electronic circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve electronic circuit problems.

It includes determining correct operation of single source parallel and series-parallel circuits and providing electronic solutions. It also includes working safely; applying problem-solving procedures, including the use of voltage, current and resistance measuring devices; and providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on electronic circuits	**1.1** WHS/OHS requirements and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Nature of the circuit/s problem is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with relevant person/s
	1.5 Sources of materials required for work are established in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out the electronic work are obtained and checked for correct operation and safety
2 Solve electronic circuit problem	**2.1** WHS/OHS risk control measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.3 Electronic circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Problem solving is approached methodically applying principles of electronic circuits using measured and calculated values
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6 Electronic circuit problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable

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		energy practices
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for electronic circuit solutions used to resolve circuit problems is documented
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in basic electronic circuits must include at least the following:	• two types of circuit problems in single source parallel and series-parallel electronic circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH169A Solve problems in basic electronic circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0065 Solve problems in basic electronic circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- determining the operating parameters of an existing circuit
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- behaviour of electrical/electronic circuits for various values of voltage, current, resistance, impedance, inductance, capacitance and reactance and variable parameters, including:
  - single source circuits
  - series circuit configurations
  - parallel circuit configurations
  - series-parallel circuit configurations
- circuit configurations, including:
  - circuit configurations are single source alternating current (a.c.) and direct current (d.c.) circuits
  - series circuits
  - parallel circuits
  - series-parallel circuits
- connection of test/measuring devices into a circuit, including safety procedures and circuit arrangement of test/measuring devices
- electronics circuit principles

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- features of testing/measuring devices, including safety, user calibration and parameter and range settings
- power supplies for electronics circuit principles
- relationship between variable parameter in electrical/electronic circuits, including:
  - variable parameters
  - voltage
  - current
  - resistance
  - impedance
  - inductance
  - capacitance
  - reactance
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes, including safe working practices and solving problems in electronic circuits
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- types of voltage testers, multimeters, clamp meters, continuity testers and insulation resistance testers and their application.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to in solving problems in electronic circuits
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot amplifiers in an electronic apparatus.

It includes preparing to troubleshoot amplifiers, troubleshooting amplifiers, completing work and documenting troubleshooting activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0067 Troubleshoot basic amplifier circuits

AND

UEECD0043 Solve problems in direct current circuits

OR

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to troubleshoot amplifiers	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of amplifier fault is obtained from documentation or from relevant person/s to determine the scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Troubleshoot amplifiers	**2.1** Workplace risk control measures and procedures are applied
	2.2 The need to test or measure live work is determined, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits are isolated where necessary in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is undertaken methodically using measured and calculated values of parameters relevant to amplifiers
	2.5 Unexpected situations are dealt with safely and with the approval of relevant person/s
	2.6 Fault finding is conducted efficiently minimising waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete work and document troubleshooting	**3.1** Workplace risk control measures and procedures are applied

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activities

3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for troubleshooting solutions is provided in the required format

3.4 Work completion is documented in accordance with workplace procedures and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting amplifiers must include at least the following:

- troubleshooting the amplifier stages of two types of electronic apparatus
- two different types of amplifier faults.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH113A Troubleshoot amplifiers in an electronic apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0066 Troubleshoot amplifiers in an electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- applying the principles of amplifiers
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- determining live testing/measurement requirements
- methodically fault finding using measured and calculated values of parameters
- identifying and accessing materials, tools, apparatus and testing devices
- isolating circuits/machines/system
- troubleshooting amplifiers, including:
  - applying methodical problem-solving methods
  - calculating parameters correctly and accurately
  - correctly and accurately taking measurements
  - providing solutions to amplifier problems
  - providing written justification for the solutions to problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- amplifier troubleshooting, including:
  - fundamentals of amplifiers
  - classes of power amplifier operation (basics)
  - complementary-symmetry power amplifiers

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- differential amplifiers
- multistage amplifier coupling methods
- negative feedback
- other solid-state power amplifier design
- relevant standards, codes and regulations
- single stage discrete amplifier:
  - direct current (d.c.) characteristics
  - small signal characteristics
  - capacitive coupling

- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to troubleshooting amplifiers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0067 Troubleshoot basic amplifier circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot basic amplifier circuits.

It includes preparing to troubleshoot basic amplifiers, solving basic amplifier circuit problems, completing work and reporting on problem-solving activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to troubleshoot basic amplifiers	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures are applied in

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		accordance with workplace procedures prior to commencing work
	1.3	Scope of the fault is obtained from documentation or discussions with relevant person/s to determine scope of work
	1.4	Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5	Materials required for work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Solve basic amplifier circuit problems	**2.1**	WHS/OHS risk control measures and workplace procedures are applied
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits are isolated, as necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding is undertaken methodically applying principles of basic amplifiers and using measured and calculated values of parameters
	2.5	Unexpected situations are dealt with safely and with the approval of relevant person/s
	2.6	Fault-finding activities are conducted efficiently minimising unnecessary waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Complete work and report on problem-solving activities	**3.1**	WHS/OHS risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for troubleshooting solutions is provided in the required format
	3.4	Work completion is reported and relevant person/s

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notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting basic amplifier circuit problems must include at least the following:	• two faults on at least two different types of operational amplifier configurations

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH139A Troubleshoot basic amplifier circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0067 Troubleshoot basic amplifier circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- isolating circuits/machines/systems
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- dealing effectively with unplanned events
- identifying and accessing materials, tools, apparatus and testing devices
- accurately taking measurements and calculating parameters
- applying methodical problem-solving techniques
- providing justification for the solutions to problems
- providing solutions to amplifier circuit problems
- using of engineering terms and formulae
- calculating of gain bandwidth product
- calculating of gain and frequency response
- using engineering formulas for calculating gain and bandwidth
- using and verifying operation of an operational amplifier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- amplifier terminal characteristics
- basic amplifier principles, including:
  - amplifier types
  - gain bandwidth product

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  - decibels, engineering terms and formulae
  - calculation of gain and frequency response
  - measurement of gain and frequency response
  - amplifier configurations - inverting, non-inverting; differential; comparator and summing; need for, and effects of, positive and negative feedback in an amplifier circuit
- practical amplifiers
- negative feedback
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant standards, codes and regulations
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to troubleshooting basic amplifiers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0068 Troubleshoot communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot communications systems.

It includes fault finding and repairing communications systems. It also includes working safely, interpreting circuit diagrams, applying logical fault-finding procedures, conducting repairs, safety and functional testing, and completing the necessary service documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0043 Solve problems in direct current circuits

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0063 Solve fundamental electronic communications system problems

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair communications system faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified obtained

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	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Nature of the communications system fault is obtained from relevant documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with relevant person/s
	1.5 Sources of materials required for work are established in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find communications system faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out communications systems work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
	2.3 Communications system apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Communications system fault finding is approached methodically using measured and calculated values of apparatus parameters
	2.5 Apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.6 Faulty components are rechecked and their fault status confirmed
	2.7 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8 Fault-finding activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices

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3 Repair communications system fault	**3.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	3.2 Apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3 Materials required for the repair work are sourced and obtained in accordance with workplace procedures
	3.4 Repairs are affected efficiently without damage to other components apparatus or circuits
	3.5 Effectiveness of the repair is inspected and tested in accordance with workplace procedures
	3.6 Apparatus is reassembled, inspected, finally tested and prepared for return to customer
4 Complete and report repair activities	**4.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2 Work area is cleaned and made safe in accordance with workplace procedures
	4.3 Written justification is documented for repairs to communications system apparatus

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH172A Troubleshoot communication systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0068 Troubleshoot communication systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- analysing and interpreting measurement results
- applying fundamental knowledge in finding faults efficiently
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- checking tools and test equipment for correct operation and safety
- consulting with relevant stakeholders regarding the nature of the problem and impacts of work to diagnose and repair
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- demonstrating signal testing and signal analysis
- demonstrating the making of relevant adjustments
- dismantling and reassembling equipment as required
- finding and repairing faults in communications system
- identifying faulty components and replacing components without damage
- making relevant measurements and calculations
- providing written justification for the repairs
- selecting and using relevant radio frequency (RF) test equipment
- selecting appropriate components and/or materials for the repairs
- using methodical fault-finding techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- measurement techniques to verify system performance and signal quality of analogue and digital signals, including parameters such as bit error rate and inter-symbol interference.
- methods to reduce effects of spurious emissions, harmonics, over-modulation and

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intermodulation distortion (IMD) on the radio frequency (RF) spectrum
- modulation and demodulation techniques, including complex modulation schemes, e.g. multiple-input/multiple-output (MiMo) and spread-spectrum
- RF and intermediate frequency (IF) amplifier principles
- RF filtering principles, including quality (Q), bandwidth and typical filter types
- RF safety precautions
- RF signal generation and conversion principles
- receiver operating principles and characteristics, including practical troubleshooting and test techniques
- regulatory and technical requirements for efficient RF spectrum access
- relevant industry standards, codes of practice and regulations
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- transmitter operating principles and characteristics, including practical troubleshooting and test techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or suitable simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in communication systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0069 Troubleshoot digital sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot digital sub-systems.

It includes working safely, applying problem-solving procedures, using measuring devices, and providing solutions from measurements and calculations to provide solutions in digital components circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to troubleshoot digital sub-systems	**1.1** WHS/OHS processes and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3 Scope of fault is obtained from documentation and/or work supervisor to determine work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Troubleshoot digital sub-systems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding of digital components is conducted using measured and calculated values of parameters in accordance with workplace procedures
	2.5 Unplanned situations are dealt with safely and with approval of relevant person/s
	2.6 Fault-finding activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete work and document troubleshooting	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed

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activities

3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting a digital sub-system must include the following:	• at least three digital components/circuits or functions • at least three faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH112A Troubleshoot digital sub-systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0069 Troubleshoot digital sub-systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- calculating parameters correctly and accurately
- carrying out fault-finding activities without waste and damage to materials, apparatus, environment or services
- checking and isolating circuits
- dealing with unplanned situations safely and with approval of relevant person/s
- determining sources of material required for work
- measuring and calculating values of parameters in fault finding
- obtaining and checking tools, equipment and testing devices for correct operation and safety
- obtaining scope of fault from documentation and/or work supervisor
- preparing to troubleshoot digital sub-systems
- seeking advice from work supervisor to ensure work is coordinated
- testing and measuring live circuits
- troubleshooting digital sub-systems
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- analogue and digital signals
- binary addition and subtraction
- combinational logic circuits, including logic gate types and characteristics, truth tables and logic gate operation
- digital building blocks, including clocks, multiplexers and demultiplexers, encoders and

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decoders, counters, flip-flops, latches and registers
- digital displays, including liquid-crystal display (LCD) and 7-segment
- digital fault-finding principles
- digital numbering schemes, including binary, hexadecimal, binary-coded decimal (BCD), American Standard Code for Information Interchange (ASCII) and Unicode
- digital sub-system building blocks
- electrostatic precautions when handling devices,
- logic families (CMOS and transistor-transistor logic (TTL)), including comparisons, input and output types, unit load and noise margin
- numbering systems, including conversions
- principles of analogue-to-digital and digital-to-analogue conversion
- problem-solving techniques
- relevant checking and isolating circuit methods
- relevant circuit measurements and parameter values calculations
- relevant digital sub-systems
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, tools, equipment and testing devices
- relevant testing and measuring methods
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures, including handling sensitive electronic components
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and relevant industry standards currently used in industry

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- resources that reflect current industry practices in relation to troubleshooting digital sub-systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0070 Troubleshoot faults in television receivers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair of faults in signal processing and scanning and deflection sections of television receivers.

It includes working safely, applying logical fault-finding workplace procedures, conducting repairs, safety and functional testing, and completing the necessary service documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0058 Repair predictable faults in television receivers

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to identify television receiver faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work activity

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	1.3 Nature of the television receiver fault is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with relevant person/s
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find television receiver faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work activities are followed
	2.2 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3 Apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding is approached methodically, using measured and calculated values of apparatus parameters, chrominance and luminance signal processing and scanning and deflection sections of television receivers
	2.5 Apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.6 Faulty components are identified, rechecked and fault status confirmed
	2.7 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	2.8 Effectiveness of the repair is tested in accordance with workplace procedures
	2.9 Apparatus is reassembled, finally tested and prepared for return to service
	2.10 Unplanned situations are dealt with safely and with the approval of an authorised person/s

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	2.11	Fault-finding activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Repair television receiver fault	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out repair work are followed
	3.2	Apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3	Materials required for repair work are sourced and obtained in accordance with workplace procedures
	3.4	Repairs are affected efficiently without damage to other components, apparatus or circuits
	3.5	Effectiveness of the repair is inspected and tested in accordance with workplace procedures
	3.6	Apparatus is reassembled, inspected and final functional test completed in preparation for return to customer
4 Complete and report television receiver fault-finding and repair activities	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Work area is cleaned and made safe in accordance with workplace procedures
	4.3	Written justification is recorded for television receiver repairs to apparatus
	4.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting faults in television receivers must include at least the following:	• two television receiver faults in signal processing and scanning and deflection sections of television receivers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH171A Troubleshoot faults in television receivers.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0070 Troubleshoot faults in television receivers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying sustainable energy principles and practices
- completing and reporting television receiver fault-finding and repair activities
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- finding and repairing faults in television receiver
- finding television receiver faults efficiently
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including the use of risk control measures
- providing written justification for television receiver repairs
- replacing television receiver components without damage
- using methodical television receiver fault-finding techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- automatic gain control (AGC) circuits in typical television receivers, including operation and fault-finding techniques
- components providing radio frequency (RF) interference suppression protection, rectification and filtering in a typical television receiver power supply
- operation of a typical television synchronous demodulator circuit
- operation of series regulated power supplies as used in typical television receiver/monitors and recording device
- operation of the switched-mode power supply (SMPS) control circuits in a television/video cassette recorder (VCR)
- operation of tuners found in typical television receivers
- operation of typical self-oscillating television/VCR/switched-mode power supply (SMPS)

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circuits
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- safe working procedures to test power supply circuitry of a typical 'hot chassis' television receiver
- sub-system arrangements and the operating principles of series and shunt type television receiver/VCR/SMPS
- techniques for locating and repairing faults in a defective SMPS in a typical television monitor or VCR
- techniques for locating and repairing faults in typical vision intermediate frequency (IF) circuits
- techniques for locating and repairing faulty components.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in television receivers
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0071 Troubleshoot fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot fire protection systems.

It includes finding and repairing fire protection system faults that include multiple connected detection, warning and fire control devices; and remote monitoring to the sub-assembly level. It also includes working safely, applying logical fault-finding workplace procedures, conducting repairs, safety and functional testing, and completing the necessary service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c). or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0041 Install fire detection and warning system apparatus

UEEEC0076 Verify compliance and functionality of fire protection system installations

UEEEC0026 Enter and verify programs for fire protection systems

UEEEC0008 Commission large fire protection systems

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and rectify fire protection system faults	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work activities
	1.3 Extent of work to be undertaken is confirmed from fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for fault-finding work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair fire protection system faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant/system interfaces are checked and isolated in accordance with WHS/OHS

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		requirements and workplace procedures
	2.4	Safety hazards resulting from the fault or breakdown are documented, assessed and risk control measures devised and implemented in consultation with appropriate person/s
	2.5	Fault finding is approached methodically using fire protection system and components and measured values of system parameters
	2.6	System components are dismantled, as required, and parts stored to protect against loss or damage
	2.7	Faulty system/components are inspected, rechecked and their fault status confirmed
	2.8	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of the fire protection system repair is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, inspected, tested and prepared for return to service
	2.11	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.12	Fault-finding and repair activities are carried out without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are tagged and despatched for repair
	3.3	Fault-finding and repair work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting fire protection systems must include at least the following:	• two fire alarm and warning systems, including:
	  • one fire alarm system with at least 50 input devices, 20 output devices and two system interface controls
	  • one fire warning system with at least 50 speakers, five interface communication devices and two warning indicators
	  • voice message facilities

Finding and repairing must include at least six of the following faults in fire alarm and warning systems:	• open circuit • short circuit • incorrect connections • insulation failure • program failure • apparatus/component failure • related mechanical failure • electrical induced interference

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH165A Troubleshoot fire protection systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0071 Troubleshoot fire protection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing documentation and reports correctly
- dealing with intermittent faults
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining scope of work from fault/breakdown reports and discussions with appropriate person/s
- finding and repairing faults in fire protection system
- finding fire protection system faults efficiently
- inspecting and testing fire protection system in accordance with workplace procedures and industry standards
- rectifying fire protection system faults effectively
- using methodical or analytical techniques in fault-finding techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- common fire protection systems faults
- effect-to-cause reasoning and assumptions of possible causes
- factors to consider in clarifying the nature of a fire protection system fault
- fire protection system fault-finding techniques
- fire protection technologies
- input devices, including conventional, analogue or analogue addressable fire detectors, flow switch connections or switch connections

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- interface communication devices can be warden in communication phones and remote public address (PA) inputs
- methods for testing assumptions
- output devices, including shutdown signal, door or system release controls and solenoid valve controls
- problem-solving concepts and techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system interface controls, including communication signals to remote control and indicating equipment, building monitoring systems, paging system and colour graphics
- types of fire protection systems and the difference between automatic and passive systems and wet and dry systems
- typical causes of intermittent faults, including vibration, shock, changes in temperature and electromagnetic interference
- warning indicators, including flashing lights for hearing impaired persons and fire brigade building indication.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in fire protection systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEEEC0072 Troubleshoot microcontroller-based hardware systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot microcontroller-based hardware systems.

It includes solving microcontroller hardware and firmware problems by determining correct operation of microcontroller system, and providing solutions derived from measurements and calculations to predictable faults in microcontroller hardware.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on microcontroller hardware	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS risk control work preparation measures and

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		procedures are followed
	1.3	Nature of microcontroller hardware problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5	Sources of materials required for the work are established in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Solve microcontroller hardware and firmware problems	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, as required, conducted within established safety procedures
	2.3	Circuits are checked as being isolated, as necessary, in strict accordance with WHS/OHS requirements and workplace procedures
	2.4	Established methods are used to solve problems from measured and calculated values as they apply to microcontroller hardware
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Problems are solved without unnecessary damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with established procedures
	3.3	Justification for solutions used to solve circuit problems are documented

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3.4 Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting must include at least two of the following types of microcontroller hardware problems:	• determining the operating parameters of an existing circuit • altering an existing circuit to comply with specified operating parameters • developing circuits to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH166A Troubleshoot microcontroller based hardware systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0072 Troubleshoot microcontroller-based hardware systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- calculating parameters correctly and accurately
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- providing solutions to microcontroller component/circuit problems
- providing written justification for the solutions to problems
- taking measurements correctly and accurately
- using an industry standard programming environment to load, test and debug code
- using methodical problem-solving methods
- using a microcontroller’s internal communications peripherals to communicate with a secondary device, including microcontroller, computer and/or sensor.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- dealing with intermittent faults
- electronic fault-finding techniques and fault identification techniques
- fault-finding methods, including visual inspection, sectional testing, split-half tests and component isolation
- input/output (I/O) ports: analogue/digital
- integrated peripherals, including timers, interrupts, hardware multiplier, internal oscillators, comparators, analogue to digital converter's (ADC’s) and digital to analogue converter's (DAC’s), pulse width modulation (PWM) modules and serial ports
- interfacing different logic level voltages in a microcontroller circuit

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- microcontroller-based systems troubleshooting
- microcontroller internal peripheral communication circuitry and associated hardware and protocols (examples include but not limited to recommended standard 232 (RS-232), I²C, SPI, and 1 wire
- microcontroller systems, including:
  - digital systems concepts associated with microcontroller-based systems
  - microcontroller architecture
  - microcontroller instruction set
  - microcontroller manufacturers
  - microcontroller system block diagram
- relevant data storage types
- relevant job safety assessments or risk mitigation processes
- relevant logic level standards
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- reset circuit
- system clock circuitry.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to fault finding microcontroller-based hardware
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEEEC0073 Troubleshoot professional audio reproduction components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot professional audio reproduction components.

It includes fault finding and repairing professional and high-end audio amplifiers, preamplifiers, receivers, graphic equalisers and speakers. It also includes working safely, applying logical fault-finding procedures, conducting repairs, safety and functional testing, and completing the necessary service documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEC0056 Repair predictable faults in audio components

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair audio reproduction component faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied

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	1.2	WHS/OHS risk control measures and procedures are followed in preparation for the work
	1.3	Nature of the audio reproduction component fault is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with relevant person/s
	1.5	Sources of materials required for audio component work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out audio component work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find audio reproduction component faults	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out audio component work are followed
	2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3	Audio reproduction apparatus component is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding is approached methodically using measured and calculated values of apparatus parameters of audio reproduction components and circuits
	2.5	Apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.6	Faulty audio components are rechecked and fault status confirmed
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Fault-finding activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable

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		energy practices
3	**Repair audio reproduction component fault**	**3.1** WHS/OHS risk control measures and workplace procedures for carrying out audio reproduction component work are followed
		3.2 Audio reproduction apparatus component is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		3.3 Materials required for the repair work are sourced and obtained in accordance with workplace procedures
		3.4 Repairs are affected efficiently without damage to audio components apparatus or circuits
		3.5 Effectiveness of the repair is tested in accordance with workplace procedures
		3.6 Apparatus is reassembled, inspected, finally tested and prepared for return to customer
4	**Complete and report repair activities**	**4.1** WHS/OHS work completion risk control measures and workplace procedures are followed
		4.2 Work area is cleaned and made safe in accordance with workplace procedures
		4.3 Written justification is made for repairs to audio reproduction apparatus component/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting professional audio reproduction components must include at least the following:	• two different faults in two different components of audio equipment

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH173A Troubleshoot professional audio reproduction components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0073 Troubleshoot professional audio reproduction components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- finding faults efficiently
- providing written justification for the repairs
- replacing components without damage
- using methodical fault-finding techniques.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant audio electronics
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sound reproduction equipment
- troubleshooting techniques
- sound reproduction fundamentals.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in professional audio reproduction components
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot resonance circuits in an electronic apparatus.

It includes working safely, applying problem-solving procedures, and providing solutions derived from measurements and calculations to problems in resonance circuits.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to troubleshoot resonance circuits	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3 Scope of fault is obtained from documentation and/or work supervisor to determine work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Solve problems in resonance circuits	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding of resonance circuits is conducted using measured and calculated values of parameters in accordance with workplace procedures
	2.5 Unplanned situations are dealt with safely and with the approval of relevant person/s in accordance with workplace procedures
	2.6 Fault-finding activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete work and document troubleshooting activities	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.**3** Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving resonance circuit problems must include at least two of the following:	• determining the operating parameters of an existing circuit • altering an existing circuit to comply with specified operating parameters • developing circuits to comply with specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- carrying out fault-finding activities without waste and damage to materials, apparatus, the environment or services
- checking and isolating circuits
- completing work and documenting troubleshooting activities
- dealing with unplanned situations safely and with the approval of relevant person/s
- demonstrating correct set-up and usage of oscilloscope for alternating current (a.c.) measurements
- obtaining and checking tools, equipment and testing devices for correct operation and safety
- obtaining scope of the fault from documentation and/or work supervisor
- preparing to troubleshoot resonance circuits
- seeking advice from work supervisor to ensure work is coordinated effectively
- solving problems in resonance circuits
- testing and measuring live circuits
- using sustainable energy practices
- calculating resonance parameters, including reactance and resonant frequency from supplied or measured values
- making measurements on resonance circuits
- making adjustments to resonance circuits.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- filter characteristics, including bandwidth, roll off, attenuation and response curves

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- filter principles and types, including high pass, low pass, bandpass and band-reject
- principles of inductance and inductive reactance
- impedance, voltage and current characteristics of parallel-resonant circuits
- impedance, voltage and current characteristics of series-resonant circuits
- measuring equipment for a.c. circuits
- Ohm's law for a.c. circuits
- power factor principles
- problem-solving techniques
- quality factor (Q) principles
- relevant checking and isolation methods for circuits
- relevant circuit measurements and parameter values calculations
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, tools, equipment and testing devices
- relevant resonance circuits
- relevant resonance formulae and definitions
- relevant testing and measuring methods
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- series, parallel and series-parallel a.c. circuits
- sinusoidal alternating voltage and current principles
- sustainable energy principles
- transformer principles and construction.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to troubleshooting frequency

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dependent circuits
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0075 Troubleshoot single phase input d.c power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine the correct operation of independent power supplies and power supply sections of electronic apparatus.

It includes troubleshooting and applying problem-solving procedures; working safely; using voltage, current and resistance measuring devices to measure and calculate; and providing solutions to predictable problems in direct current (d.c.) power supplies with single phase inputs.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

OR

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

OR

UEEEC0065 Solve problems in basic electronic circuits

OR

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

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Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Troubleshoot d.c. power supplies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are obtained and applied
	1.2 Nature of d.c. power supplies fault is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.3 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.4 Materials required for the work are determined in accordance with workplace procedures
	1.5 Tools, equipment and testing devices required to carry out the work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Solve d.c. power supply problems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Power supply fault finding is approached methodically in accordance with workplace procedures, drawing on knowledge of d.c. power supplies and using measured and calculated values of parameters
	2.3 Fault-finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving	**3.1** WHS/OHS risk control measures and workplace

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activities		procedures for work completion are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve single phase input d.c. power supply problems are documented in accordance with workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Troubleshooting d.c. power supply problems must include:	• single phase input on the rectification section • filtering section of a half wave and full wave rectifiers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH111A Troubleshoot single phase input d.c power supplies.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0075 Troubleshoot single phase input d.c power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
    - using risk control measures
- checking tools, materials, equipment and testing devices for correct operation and safety
- testing or measuring on live and operating system safely
- ensuring circuits are isolated
- communicating effectively with relevant stakeholders
- completing work and required documentation
- maintaining a clean worksite and equipment
- referring to relevant documentation to determine the fault
- solving direct current (d.c.) power supply problems
- troubleshooting d.c. power supplies with single phase input, including:
    - using methodical problem-solving methods
    - providing written justification for the solutions to d.c. power supplies problems
    - dealing with unplanned events in accordance with workplace procedures
    - taking measurements correctly and accurately
    - calculating parameters correctly and accurately
    - providing solution to power supply problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- power supplies operating principles and applications, including:
    - block diagram identifying each sub-system
    - constant voltage and current

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- expected waveforms in a power supply
- power supply function
- d.c. rectification circuits, including:
  - dual rail supply
  - half wave and full wave rectifiers
  - junction diode characteristics
  - transformer turns ratio and losses
- filter circuits, including:
  - capacitive and inductive filters
  - ripple
- zener diode regulator, including:
  - load and line regulation definitions
  - operating parameters and data sheets
  - zener shunt regulator circuit
- three terminal regulator circuits, including:
  - line and load regulation
  - need for regulation
  - regulated power efficiency
  - remote voltage sensing
  - short circuit protection
  - three terminal regulator characteristics and faults
- electronic testing and measuring devices and techniques, including:
  - test/measuring devices and their application, including:
    - multimeters
    - signal generators and oscilloscopes
    - voltage and digital testers
  - connection of test/measuring devices into a circuit, including:
    - circuit arrangement of test/measuring devices
    - safety procedures
  - taking readings
  - storage, maintenance and care of test/measuring devices
- d.c. power supply testing and fault-finding including:
  - rectifier diode faults
  - zener diode faults
  - three terminal regulator faults
  - capacitor faults
- safe working practices and relevant standards, codes and regulations.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0076 Verify compliance and functionality of fire protection system installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify compliance and functionality of fire protection system installations.

It includes testing and visual inspection for verifying that a fire protection system and components are safe and comply with requirements and functions. It also includes working safely, conducting compliance tests, conducting visual inspections, identifying non-compliance defects and mandatory reporting requirements.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEC0041 Install fire detection and warning system apparatus

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to verify fire protection installation	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work activities
	1.3 Safety hazards that have not previously been identified are assessed, noted and job safety assessments and risk control measures determined and implemented
	1.4 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5 Location of fire protection system components is determined from job specifications and diagrams
	1.6 Inspection and tests are appropriately sequenced in accordance with job schedule and workplace procedures
	1.7 Materials needed for the fire protection system tests and verification are obtained in accordance with workplace procedures and checked against job requirements
	1.8 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Visually inspect fire protection installation	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out verification work activities are followed
	2.2 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures

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	2.3	Cabling/wiring is checked for appropriate type and size
	2.4	Cabling/wiring accessories and fire alarm warning components are validated as being suitably located, securely fixed and suitably protected from damage or corrosion
	2.5	Accessories and components are validated as being appropriately rated and meeting functional requirements
	2.6	Fire protection equipment compliance is verified in accordance with safety and functional requirements
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.9	Inspection is carried out efficiently without waste of materials or damage to fire protection apparatus, the surrounding environment or services using sustainable energy practices
3 Conduct fire protection compliance tests	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out fire protection testing are followed
	3.2	Back-to-base facilities and system interfaces are isolated in accordance with workplace procedures
	3.3	Testing and measuring of live work and operating system is conducted in accordance with WHS/OHS requirements and within workplace safety procedures
	3.4	Circuits/machines/plant/other system interfaces are checked and isolated to ensure the system is not activated during testing in accordance with WHS/OHS requirements and workplace procedures
	3.5	Electrical inspections and tests are conducted to verify the electrical circuit within the fire installation is safe and functional in accordance with job specifications
	3.6	System tests are conducted to verify that the fire protection equipment and cabling/wiring within the fire protection installation is safe and functions as intended

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	3.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	3.8	Unplanned situations are dealt with safely and with the approval of relevant person/s
	3.9	Testing is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
4 Report inspection and verification findings	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	4.3	Non-compliance defects are identified and reported in accordance with workplace procedures
	4.4	Recommendations for rectifying defects are made in accordance with workplace procedures
	4.5	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying compliance and functionality of fire protection system installations must include at least the following:	• two different new or existing fire protection installations, including:
	  • one fire alarm system with at least 50 input devices, 20 output devices and two system interface controls
	  • one fire warning system with at least five

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speakers, five interface communication devices and two warning indicators
- voice message facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH162A Verify compliance and functionality of fire protection system installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0076 Verify compliance and functionality of fire protection system installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- acting within regulatory limits
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- conducting electrical tests safely and correctly
- conducting fire alarms and warning tests safely and correctly
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying non-compliant defects from test results
- identifying visual defects
- recommending appropriate corrective actions
- reporting legibly and accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- features of fire protection installations that can be visually inspected
- fire alarm and warning system routine testing
- fire protection installations, testing and verification methods
- relevant inspection and testing techniques
- relevant job safety assessments or risk mitigation processes
- relevant mandatory and optional testing and verification requirements applicable to fire protection installations
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to verifying compliance and functionality of fire protection installations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEC0077 Verify functionality and compliance of custom electronic installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify functionality and compliance of custom electronic installations. It includes preparing to verify custom electronic installations, visually inspecting the installation, conducting tests, reporting inspection and verifying findings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

UEEEC0004 Assemble and set up fixed video/audio components and systems in buildings and premises

Competency Field

Electronics and Communications

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to verify custom electronic installations	**1.1** WHS/OHS requirements and workplace procedures for relevant work area are identified, obtained and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed and reported to relevant person/s, and control measures implemented
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others on worksite
	1.5 Location of system components is determined from specifications and diagrams
	1.6 Inspection and tests are sequenced in accordance with job schedule
	1.7 Materials required for tests and verification are obtained in accordance with workplace procedures and checked against job requirements
	1.8 Tools, equipment and testing devices required to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Visually inspect the installation	**2.1** Workplace risk control measures and workplace procedures are applied
	2.2 Circuits/machines/plant are isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3 Cabling is checked for appropriate type and size
	2.4 Cabling accessories and components are checked as being suitably located, securely fixed and suitably protected from damage or corrosion

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	2.5	Accessories and components are checked as being appropriately rated and meeting functional requirements
	2.6	Evidence that equipment complies with safety and functional requirements is confirmed in accordance with relevant industry standards
	2.7	Unplanned situations are dealt with in accordance with workplace procedures, discussed with relevant person/s and documented
	2.8	Unexpected situations are dealt with safely and with the approval of relevant person/s
	2.9	Inspection is conducted efficiently minimising waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
3 Conduct tests	**3.1**	Workplace risk control measures and workplace procedures are applied
	3.2	Testing or measuring on a live and operating system is conducted in accordance with WHS/OHS requirements and workplace procedures
	3.3	Circuits/machines/plant are isolated in strict accordance with WHS/OHS requirements and workplace procedures
	3.4	Tests are conducted to verify that cabling is safe, meets specified standards and any relevant regulatory requirements
	3.5	Custom electronic apparatus and devices are tested to ensure safe installation and intended functionality
	3.6	Unexpected situations are dealt with in accordance with workplace procedures, discussed with relevant person/s and documented
	3.7	Unexpected situations are dealt with safely and with the approval of relevant person/s
	3.8	Testing is conducted efficiently, minimising waste of materials, damage to apparatus, the surrounding environment or services applying sustainable energy practices
4 Report inspection and	**4.1**	WHS/OHS work completion risk control measures and

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verification findings	procedures are applied
	4.2 Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	4.3 Non-compliance defects are identified and reported in accordance with workplace procedures
	4.4 Recommendations for rectifying defects are made in accordance with workplace procedures
	4.5 Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying compliance and functionality of custom electronic installations must include at least the following:	• two different new or existing custom electronic installations • one installation, including a basic integrated system
Verification must include at least the following:	• visual inspection of cabling, accessories, apparatus and controls • conducting all safety and compliance tests
Testing must include at least the following:	• isolation testing • insulation resistance • cable tests to specified standard (e.g. Category 5 standard) • polarity tests • continuity of earthing • correct connections performance tests

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEH105A Verify functionality and compliance of custom electronic installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEC0077 Verify functionality and compliance of custom electronic installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- completing reporting in accordance with workplace procedures
- complying with relevant regulations
- conducting all tests safely and correctly
- coordinating work with relevant person/s
- dealing effectively with unplanned events
- identifying and accessing materials, tools, apparatus and testing devices
- identifying non-compliant defects from test results
- identifying visual defects
- isolating circuits/machines/system
- recommending appropriate corrective actions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- custom electronic installations, testing and verification methods, including:
  - audio reproduction, electronic components:
    - preamplifiers amplifier
    - power and integrated amplifiers
    - graphic equalisers
  - audio reproduction and speaker fundamentals
  - audio/video recording and replay components repair basics

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  - audio/video control equipment
  - electronic safe working practices
  - relevant standards, codes and regulations
  - sound reproduction fundamentals
  - video systems installation
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to verifying compliance and functionality of custom electronic installations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0001 Apply compliance requirements to all aspects of electrical work

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply compliance requirements to aspects of electrical work.

It includes applying work health and safety (WHS)/occupational health and safety (OHS) requirements for preparing and inspecting electrical installations, and documenting activities and outcomes.

This unit is intended for electrical licence holders who, according to the regulatory authority, have exhibited recalcitrance in their licence and/or WHS/OHS duty of care obligations.

Competency in this unit can only be gained by persons who hold a current 'Unrestricted Electrician's Licence' issued in an Australian state or territory.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Apply risk management	**1.1** Access to worksite is obtained in accordance with

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	requirements		WHS/OHS requirements and relevant industry standards
		1.2	WHS/OHS risk control measures and workplace procedures given in safe work method statements (SWMS) and/or job safety analysis (JSA) documents are identified, followed and applied
		1.3	WHS/OHS hazards not previously identified are noted, risk assessed and risk control measures implemented in accordance with WHS/OHS procedures
		1.4	Risk and control measures for a new or changed hazard are documented in accordance with WHS/OHS requirements and workplace procedures
		1.5	Hazards created by other site activities are referred to appropriate person/s in accordance with workplace procedures
		1.6	WHS/OHS documents for incidents reports are maintained in accordance with workplace procedures and relevant industry standards
2	**Ensure electrical installations are safe for use**	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
		2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
		2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Compliance of an installation is confirmed in accordance with relevant industry standards
3	**Document risk management activities**	**3.1**	Non-compliance defects are identified and reported in accordance with workplace procedures
		3.2	Recommendations for rectifying defects are made in accordance with workplace procedures
		3.3	Documentation is completed in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG198A Apply compliance requirements to all aspects of electrical work.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0001 Apply compliance requirements to all aspects of electrical work

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- following requirements to gain entry to a worksite
- following work health and safety (WHS)/occupational health and safety (OHS) compliance requirements, control measures and procedures
- identifying new and changed hazards, assigning a realist level of risk and establishing appropriate control measures
- maintaining WHS/OHS documents and incidents and issues reports in accordance with requirements
- determining whether an electrical installation is compliant in accordance with regulations
- documenting installation compliance verification activities and outcomes
- dealing with unplanned events
- ensuring electrical installations are safe for use.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical work compliance requirements of electrical work testing and verification, including:
  - WHS/OHS requirements encompassing:
    - legislated regulations
    - responsibilities of employers and employees
    - hazards and risks and control measures
    - safe work method statements (SWMS)/job safety analysis (JSA)
    - identifying potential workplace hazards and establishing control measures
    - maintaining WHS/OHS documents
  - electrical installation safety requirements encompassing:
    - legislated regulations
    - visual inspecting of installations

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    - testing installations
    - documentation
  - safety requirements, including local service rules and application of current editions AS/NZS 3000 following AS/NZS 3017 Electrical installations - Verification guidelines
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications
- relevant quality workplace procedures
- relevant testing devices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0002 Apply currency of safe working practices and compliance verification of electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply currency of safe working practices and compliance verification of an electrical installation.

It includes preparing, following and applying safe work practices for a work area to verify compliance of an electrical installation.

The licensing regulator may require a holder of Unrestricted Electrician's Licence or Qualified Electrical Contracting Licence to undertake this unit periodically to demonstrate currency in safe working, electrical rescue practices and compliance verification of electrical installations.

A person competent in this unit will hold an Unrestricted Electrical Licence issued in an Australian state or territory and be able to apply compliance requirements to all aspects of electrical work in accordance to relevant industry standards and regulations.

Competency in this unit can only be gained by persons who hold a current 'Unrestricted Electrician's Licence' issued in an Australian state or territory.

This unit is subject to the following requirements:

- legislation, regulations, relevant industry standards and codes of practice for electrical work, including specific work health and safety (WHS)/occupational health and safety (OHS) legislation and regulatory requirements
- electrical licensing requirements – Unrestricted Electrical Work
- legislation, regulations, relevant industry standards and codes of practice for renewable energy (RE).
- Note: there may be variations in these requirements across jurisdictions.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter a work area and verify compliance of an electrical installation	**1.1** Work area access permits are obtained from appropriate person/s in accordance with workplace procedures
	1.2 Safe work practices for controlling risk are obtained and applied prior to undertaking a work activity
	1.3 Preparations for electrical and non-electrical isolation are carried out to prevent hazards from loss of machine/system/process control in accordance with workplace procedures
	1.4 Installation documentation is reviewed and applied in accordance with relevant industry standards
	1.5 Appropriate person/s is consulted to ensure work is coordinated effectively with others
	1.6 Tools and equipment needed for the work are checked for safety and functionality in accordance with workplace procedures and relevant industry standards
2 Follow workplace procedures for hazard identification	**2.1** WHS/OHS hazards are identified, risks are assessed, and control measures implemented and monitored
	2.2 Hazards in the work area are identified and reported to appropriate person/s in accordance with workplace procedures
	2.3 WHS/OHS incident reporting is completed in accordance with workplace procedures
	2.4 Workplace instructions and workplace training are followed in accordance with workplace procedures

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3	**Apply safe work practices to verifying an electrical installation**	**3.1** Safe work practices for controlling risks are followed
		3.2 Workplace procedures for accidents, fires and emergencies are followed in accordance with workplace procedures and appropriate person/s identified
		3.3 Need to test and measure live electrical work is identified in accordance with WHS/OHS requirements and workplace procedures
		3.4 Compliance of electrical equipment and installation is assessed by inspection in accordance with relevant industry standards
		3.5 Tests are conducted for compliance and safety parameters of installed circuits, switchgear protection and earthing in accordance with industry standards and workplace procedures
4	**Report compliance findings**	**4.1** WHS/OHS risk control measures and workplace procedures are followed
		4.2 Worksite is cleaned and made safe in accordance with workplace procedures
		4.3 Defects are identified and reported in accordance with relevant industry standards and workplace procedures
		4.4 Recommendations for rectifying defects are made in accordance with workplace procedures
		4.5 Documentation is completed in accordance with industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Verifying compliance of an electrical installation must include at least two circuit supplying fixed appliances, including one three phase, from the following:

- a main switchboard
- supplying more than one circuit each for lighting and socket outlets
- a distribution board separate from the main switchboard

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG197A Apply currency of safe working practices and compliance verification of electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0002 Apply currency of safe working practices and compliance verification of electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- preparing to enter a workplace
- identifying work safety hazards
- applying current safe working practices
- identifying visual non-compliance defects
- using effective methods for conducting mandatory and optional tests
- identifying non-compliance from test results
- identifying causes of non-compliance
- completing mandatory reporting
- dealing with unplanned events
- applying industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures and instructions
- obtaining and checking tools and equipment
- assessing risks
- implementing and monitoring control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- current requirements of safe working practices and WHS/OHS, including:
  - the current legal requirements covering WHS/OHS in the workplace
  - the current work environment in relation to safety signage, emergencies, fire protection, ensuring personal safety, industrial housekeeping and pollution sources and controls

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- hazards and risks and control measures in working on construction sites:
  - hazards, including (not limited to) manual and mechanical handling, working at heights, working in confined spaces, noise and dusts
- workplace safety check, identifying potential workplace hazards and suggested measures for accident prevention
- working safely with electrical tools or equipment
- current procedure for safe isolation of an electrical supply
- hazards associated with, extra-low voltage (ELV), low voltage (LV), high voltage (HV) and high currents
- hazards and control measures associated with electrical work
- emergency procedures and equipment for the rescue of an electric shock victim
- emergency first aid for an electric shock victim:
  - emergency first aid is limited to first-on-the scene assistance to a victim of electric shock, and basics of cardiopulmonary resuscitation (CPR)

- electrical installations testing and verification, including:
  - current electrical installations legislated regulations and responsibilities of a licensed electrician
  - current compliance standards and regulatory requirement of electrical equipment and how and where it is installed
  - current compliance standards and regulatory requirement for testing safety parameters of installed circuits, switchgear, protection and earthing
  - current compliance standards and regulatory requirement for documenting and reporting compliance inspection and testing outcomes
- relevant industry standards
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation including access permits and incident reporting
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0003 Arrange circuits, control and protection for electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select, arrange and terminate circuits, control and protection devices and systems for electrical installations operating at low voltage (LV).

It includes protection of persons and property, correct functioning, ensuring compatibility with the supply, arranging installation into circuits, selecting and arranging switchgear/control gear and protective devices to meet compliance requirements, and documenting arrangement decisions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare electrical circuits, control and protection installation	**1.1** The extent and nature of the electrical installation is determined from job specifications
	1.2 Hazards are identified, risks are assessed and control measures are implemented
	1.3 Load requirements for individual current-using equipment is determined from job specifications and/or consultation with appropriate persons
2 Arrange electrical circuits, control and protection	**2.1** Circuits, control and protective devices are arranged to ensure safe and functional operation of the installation and to comply with relevant industry technical standards and job specification requirements
	2.2 Earthing is arranged and terminated to comply with the multiple earthed neutral (MEN) system requirements
	2.3 Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit protection in accordance with relevant industry technical standards
	2.4 Residual current devices (RCDs) are selected to meet

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		the required circuit switching and tripping currents, in accordance with relevant industry technical standards
	2.5	Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements
	2.6	Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with relevant industry technical standards
3 Document electrical installation circuits, control and protection arrangements	**3.1**	Evidence is obtained from manufacturer/suppliers that electrical equipment selected complies with safety requirements in accordance with workplace procedures
	3.2	Device selection/s rationale and calculations are documented in accordance with workplace procedures
	3.3	Electrical installation and specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Arranging circuits for control and protection must include at least two electrical installations comprising:	• a main switchboard, supplying more than one circuit each for:
	  • lighting
	  • socket outlets
	  • fixed appliances
	• one installation must include a circuit supplying a three-phase load
	• one installation must include a distribution board separate from the main switchboard

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG063A Arrange circuits, control and protection for electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0003 Arrange circuits, control and protection for electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- determining the extent and nature of the installation for job specifications
- arranging the control and protection for electrical installations with and without safety services
- arranging, testing and terminating a multiple earthed neutral (MEN) earthing system
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices
- applying safety principles for electrical systems in buildings and premises
- applying sustainable energy principles and practices
- calculating prospective fault current in accordance with minimum fault levels specified by local supply authority
- calculating earth fault-loop impedance
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining requirements for discrimination and back-up protection for coordination of protection devices
- determining individual load requirements
- arranging and terminating circuits, control and protective devices to comply with requirements
- selecting circuit protective devices and residual current devices (RCDs) that comply with all requirements
- selecting minimum size-earthing conductors in accordance with relevant industry standards
- selecting circuit breakers to operate when installation is in island mode
- selecting RCDs/residual-current circuit breaker with overcurrent protection (RCBO) to operate when installation is in island mode
- drawing arrangements of 2-pole RCDs, 4-pole RCDs and combination RCDs
- obtaining evidence of compliance for the equipment selected
- dividing installation into circuits
- selecting equipment for damp situations
- coordination of protection devices and circuit wiring

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- selecting overcurrent protection devices, fuses, circuit breakers, RCDs/RCBOs, emergency controls, isolation devices, functional controls and shutdown devices
- selecting a device for fault current limiting protection
- documenting installation arrangement, specification for items selected and reasons for the selections made.

Knowledge Evidence

- AS/NZS 3000 safety principles and deemed to comply requirements including:
  - definition of terms
  - direct contact with live parts
  - indirect contact with live parts
  - thermal effects of current
  - overcurrent
  - earth faults
  - abnormal voltages
  - spread of fire
  - mechanical injury
  - external influences
  - fundamental principles of; installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs), and verification of compliance
  - methods and devices that comply with industry standards for providing protection against indirect contact
  - requirements for installation design and selection of equipment, including:
    - compliant protection arrangements
    - correct functioning
    - compatibility with supply
  - arrangement of circuits
- circuit and control arrangements, including:
  - reason for dividing electrical installations into circuits
  - factors to be considered in determining the number and type of circuits required for an installation
  - daily and seasonal demand for lighting, power, heating and other loads in a given installation
  - number and types of circuits required for a particular installation
  - diagrams/schedules of circuits for given installations
  - application and arrangements of separated extra-low voltage (SELV) and protected extra-low voltage (PELV) circuits, including earthing requirements and testing
  - application and arrangement of an isolated supply
- hazards and risks in an electrical installation, including:
  - effects on the human body of various levels of alternating current (a.c.) and direct current

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(d.c.) current and duration of current flow for various current paths
    - risk of ignition of flammable materials due to the thermal effects of current or electric arcs in normal service of an electrical installation
    - risk of injury from mechanical movement of electrically actuated equipment
    - protection against direct contact (basic protection)
    - acceptable methods
    - use of ELV
- protection against indirect contact, including:
    - indirect contact with live parts of an electrical installation may occur
    - components of the 'automatic disconnection of supply' method of protection against indirect contact
    - the terms ‘touch voltage’ and ‘touch current’
    - the current path when a short circuit fault to exposed conductive parts of an appliance occurs
    - protection against indirect contact is by the use of Class II equipment and by electrical separation
    - additional protection by use of RCDs
    - protection against indirect contact by use of ELV and electrical separation
    - protection requirements for damp situations
- earthing, including:
    - parts of an earthing system and the purpose of each, including the terms:
        - earthed
        - earthed situation
        - earth electrode
        - equipotential bonding
        - MEN system
        - protective earth-neutral (PEN) conductor
        - main earthing conductor
        - protective earthing (PE) conductor
        - functional earthing
        - MEN link
    - typical arrangement for a MEN system and for a range of installation arrangements of PE conductors
    - typical earthing arrangements for outbuildings
    - alternate earthing systems only when required by local Regulatory Authorities (e.g. TT low voltage supply earthing system in dairy sheds in New Zealand)
- requirements for equipotential bonding in a range of installation situations
- protection against overload and short circuit current, including:
    - overload current or fault currents in an electrical installation
    - limitations of the use of overcurrent protection on current limited sources
    - equivalent circuit of an earth fault-loop

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  - level of fault current possible at a given point in an installation from the fault-loop impedance and data from the local supply authority
  - requirements for coordination of protection devices for discrimination and back-up protection, and between protective devices and conductors of an installation
  - methods and devices that comply with industry standards for providing protection against the damaging effects of overload and fault current
- devices for automatic disconnection of supply, including:
  - operating principles of thermal/magnet circuit breakers, common types of fuses and RCDs
  - tripping characteristics of various types of circuit breakers
  - time/current curves and fusing characteristics of various types of fuses
  - tripping characteristics of various types of RCDs
  - factors in a fault-loop that will affect the impedance of the circuit
  - maximum impedance of an earth fault-loop to ensure operation of a protection device
- protection against over voltage and under voltage, including:
  - causes of over and under voltage and how this may affect the electrical system
  - methods for protection against over and under voltage
- control of an electrical installation and circuits, including:
  - switch types, current and voltage ratings and ingress protection (IP) rating and where these apply
  - switching requirements for isolation, emergency, mechanical maintenance and functional control
  - control arrangement for complete installations with and without safety services and an alternative supply, including:
    - d.c. polarity requirements
    - correct rating of d.c. switches
- switchboards/distribution boards including:
  - purpose, types and applications
  - physical and circuit arrangements for whole current and current transformer metering
  - physical and circuit arrangements of main switches, circuit protection devices, fault current limiters and metering equipment, and other distributor equipment
  - switchgear types, ratings, characteristics and applications related to alternate supplies
  - compliance requirements, including:
    - location and access
    - arc-fault protection
    - identification
    - construction suitability
    - equipment marking
    - wiring
    - fire protection
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective (PPE) equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0004 Carry out basic repairs to electrical components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and/or replace mechanical and electrical components of electrical apparatus.

It includes working safely, following written and oral instructions and workplace procedures, basic testing and techniques for dismantling and assembling apparatus, and disconnecting and reconnecting components

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair electrical apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.2 Existing WHS/OHS risk control measures and workplace procedures in preparation for work are followed
	1.3 Nature of electrical components and equipment repair is obtained from documentation and work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for the electrical components and equipment work are determined in accordance with workplace routines and procedures
	1.6 Tools, apparatus and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Repair electrical apparatus	**2.1** Existing WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, as required, conducted within workplace safety procedures
	2.3 Circuits/apparatus are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Apparatus is dismantled in accordance with manufacturer guidelines and supervisor instructions
	2.5 Component parts are tagged during dismantling to ensure correct and efficient reassembly and are stored to protect against loss or damage
	2.6 Repairs are completed efficiently without damage to other components, electrical apparatus or circuits
	2.7 Apparatus is assembled in sequence with components parts placed, secured and connected in accordance with manufacturer guidelines and/or industry standard practices
	2.8 Referring unplanned events to supervisor for direction are followed in accordance with workplace procedures

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	2.9	Repairs are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report electrical repair work activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Repaired electrical apparatus is prepared for inspection and testing by appropriate person/s in accordance with workplace procedures
	3.3	Work area is cleaned and made safe in accordance with workplace procedures
	3.4	Work supervisor is notified of repair work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out basic electrical apparatus repairs must include at least the following:	• two different electrical apparatus, in which three different types of components are faulty: • one of which requires disconnecting and reconnecting internal wiring to affect repairs

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG111A Carry out basic repairs to electrical components and equipment.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0004 Carry out basic repairs to electrical components and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using of risk control measures
- applying sustainable energy principles and practices
- carrying out basic repairs to electrical apparatus, including:
  - following manufacturer service instructions for access to components
  - removing at least three different types of components specified in the work instructions
  - replacing components to manufacturer requirements
  - terminating internal wiring correctly
  - reassembling the apparatus correctly
  - testing apparatus operation
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- completing and reporting repair work activities
- implementing WHS/OHS workplace procedures and practices
- preparing to test and repair electrical apparatus
- repairing electrical apparatus in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- basic cable and conductor terminations, including:
  - application of connecting devices for conductors and terminals
  - continuity through connections and insulation resistance testing
  - general aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes (A)

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    - insulation removal and replacement
    - stress release on cables/conductors
- electrical workshop and metal cutting
- electrical workshop machines, including:
    - drilling operations
    - fixed position power tools
    - off-hand grinding safety and machine set-up
    - tooling used on drilling machines
    - twist drills features, sharpening and faults
- principles of metal cutting, including:
    - effects of coolants and cutting fluids
    - effects of cutting tool geometry
    - factors influencing the action of cutting tools
    - principles of chip formation
- selection of cutting tools, including:
    - cutting tool materials
    - factors influencing tool selection
    - identification and selection of carbides
    - milling cutting tool design
    - principles of chip control
    - turning cutting tool design
- metal cutting conditions, including:
    - conditions under which tools cut best
    - determining cutting data
- cutting tool defects, including:
    - causes of tool failure
    - identification of types of tool failures
- overcoming causes of tool failure
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- selection of cutting tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0005 Develop and connect electrical control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, connect and functionally test electrical power and control circuits that perform specific control functions.

It includes working safely, developing schematic diagrams and converting them to wiring diagrams, selecting and connecting contactors and control devices to perform a specific function. It also includes testing electrical control circuits and completing circuit development activities documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

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and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Develop electrical control circuits	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified obtained and applied
	1.2 Control circuit/s requirements are determined from discussions with relevant person/s and documented in accordance with workplace procedures
	1.3 Agreement for the control circuit/s requirement is sought from appropriate person/s and documented in accordance with workplace procedures
	1.4 Schematic arrangement of control circuits that complies with agreed requirement is documented in accordance with workplace procedures
	1.5 Wiring diagram of control circuits is developed from schematic diagram in accordance with workplace procedures
	1.6 Materials needed to connect control circuit/s are obtained in accordance with workplace procedures and checked against job requirements

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	1.7	Tools, equipment and testing devices needed to connect control circuit/s are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.8	Preparatory work is checked to ensure no damage has occurred and complies with control circuit/s application requirements
2 Connect and test electrical control circuits	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted within established safety workplace procedures
	2.3	Circuits/machines/plant are checked and isolated as required in accordance with WHS/OHS requirements and workplace procedures
	2.4	Control circuit component/s are connected to comply with the agreed control requirements
	2.5	Control circuit operation is tested for functionality and in accordance with WHS/OHS requirements and workplace safety procedures
	2.6	Non-compliant control functions are rectified
	2.7	Unplanned situations are dealt with safely and with the approval of an authorised person in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Control circuits are connected, inspected and tested without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy practice
3 Complete and document circuit development activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	'As-connected' control circuits are documented using standard drawing conventions and appropriate person/s

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notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, connecting and functional testing must include at least four of the following electrical control circuits:	• machine interlocked circuit • machine safety circuit • motor jogging circuit • multiple stop-start circuit • single stop-start circuit • time controlled circuit
Developing, connecting and functional testing must include at least three of the following components and electrical devices:	• contactors • electromechanical relays • programmable relays • push buttons • reduced voltage starters • soft starters • three phase starters • variable speed drives
Developing, connecting and functional testing must include at least two of the following transducers/sensors:	• float switches • light sensors • limit switches • photoelectric cells • pressure switches • proximity switches • temperature sensors • timers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG109A Develop and connect electrical control circuits.

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Links

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Assessment Requirements for UEEEL0005 Develop and connect electrical control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- using manufacturers' catalogues to select:
  - circuit components for appropriate duty ratings
  - control devices for specified requirements
  - pushbuttons/pilot lamps for specific requirements
  - relays for specified requirements
  - the most suitable motor starter for a given situation
  - timers for specified functions
- labelling wires and terminals
- converting circuit (schematic) diagrams to wiring diagrams
- developing:
  - electrical control circuit in accordance with a written description (specification) and listing the sequence of operation of the circuit
  - forward reverse circuit requiring interlocking from a description of the circuit operation, including jog and interlock functions
  - control circuit incorporating local and remote start and stop buttons and electrical interlocking
  - simple stop-start control circuit that incorporates pilot lights and latching circuit
  - timer controlled circuits from a written description and listing the sequence of circuit operation
- measuring starting current and torque of selected motor starters
- connecting and testing:
  - circuit with a braking feature to operate a three phase motor
  - control devices into control circuits
  - direct-on-line (DOL) motor starter and testing the operation of the power and control

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circuits
    - variable speed drive (VSD)
    - electronic (soft) starter
    - electrical circuits with local and remote start-stop control
    - input and output devices to a programmable relay using a diagram
    - motor starter power and control circuits for correct operation
    - multiple motor starting circuit which incorporates start, stop and jog control
    - simple electrical control circuit from circuit diagrams
    - timer controlled circuit using a circuit diagram as a guide
- completing and documenting circuit development activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating principles, basic contact configurations and identification and common applications of:
    - control relays
    - timers
    - contactors
    - thermal overloads
- control circuits, including:
    - converting circuit (schematic) diagrams to wiring diagrams
    - identification of circuit diagrams (schematic) symbols and explain the operation of components represented
    - switching configurations and common applications of push buttons
    - control circuit drawing conventions
- remote stop-start control and electrical interlocking, including:
    - operation of:
        - local and remote start-stop control of relays
        - operation of an electrically interlocked control circuit
    - applying circuit checking and testing techniques to an electrical control circuit
- time delay relays, including timer circuit checking and testing procedures
- circuits using contactors, including:
    - circuit diagram symbols
    - circuit development using a contactor
    - using contactors for motor control
- jogging and interlocking, including:
    - purpose and application of:

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        - jogging control of motors
        - electrical/mechanical interlocking
    - operation of motor control using start, stop and jog buttons
- control devices, including:
    - common control devices used in automatic control circuits: limit switches, proximity switches, photoelectric cells, pressure switches, float switches, light sensors and temperature sensors
    - basic operating principles of common control devices
    - advantages and disadvantages of common control devices
    - applications for common control devices
- programmable relays, including:
    - advantages of programmable relays over electromagnetic control circuit control
    - typical applications of programmable relays
    - block diagram representation and basic operating principles
    - input and output parameters, listing, connections and output types
    - basic programming of ladder circuits consisting of inputs, outputs i.e. stop-start circuit
    - using the monitoring facility of the programmable relay to verify each ladder circuit operation
    - programming timers and using the monitoring facility of the programmable relay to check the values of the timer
    - external devices
    - implications of programming normally closed field devices
    - conversion of control circuits
    - common faults and their symptoms
- three phase induction motor starters, including:
    - reasons for limiting the starting current of large motors
    - requirements of AS/NZS 3000 and the local supply authority requirements, with regard to starting and control of motors
    - operating principles, applications and circuits for:
        - direct on line (DOL) starter
        - variable speed drive (VSD)
        - variable frequency drive (VFD)
        - electronic (soft) starter
- three phase induction motor starters- reduced voltage, including:
    - operating principles and circuits for reduced voltage starters
    - common applications for starter types
    - comparison of motor starters basic characteristics
- three phase induction motor reversal and braking, including:
    - operating principles and control circuits for reversal and braking methods
    - comparison of the different braking methods used

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  - typical applications for braking methods
- three phase induction motor speed control, including:
  - operating principles and circuits for motor speed control
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0006 Develop detailed and complex drawings for electrical systems using CAD systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop detailed and complex drawings for electrical systems using computer-aided design (CAD) systems.

It includes 2-D and 3-D drawing formats covering a representative range of electrical systems, such as installations with alternative supplies, installations over 400 ampere (A) per phase at low voltage (LV) and/or high voltage (HV), single or multi-tenancies, heavy plant, switchgear, protection systems, earthing, power factor correction, control equipment, and energy monitoring and management.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0033 Use engineering applications software on personal computers

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0007 Develop detailed electrical drawings

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop detailed and complex drawings for electrical systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 The scope of detailed and complex electrical drawings is interpreted from workplace documentation and/or work instructions
	1.4 Electrical drawing details required for work are identified in accordance with project specifications and workplace procedures
	1.5 Relevant personnel are consulted to ensure the work is coordinated effectively with others
	1.6 Relevant software tools, components, materials and equipment needed for the work are selected in accordance with workplace procedures
2 Develop detailed and complex drawings for electrical systems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Design layouts and detailed and complex electrical drawings are determined from project specifications for the electrical systems
	2.3 Technical data of electrical system component/s are identified to determine parameters to be detailed in

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		electrical drawings
	2.4	Relevant software tools are used to produce detailed and complex electrical drawings in accordance with workplace procedures
	2.5	Detailed and complex electrical drawings are checked for accuracy in accordance with project specifications and workplace procedures
	2.6	Unplanned situations are dealt with safely and in accordance with workplace procedures
3 Complete detailed and complex drawings for electrical systems	**3.1**	Completed detailed and complex electrical drawings are submitted to relevant person/s to be checked for accuracy in accordance with project specifications and workplace procedures
	3.2	Alterations, additions or correction instructions are followed and detailed and complex electrical drawings re-submitted for final approval
	3.3	Completed detailed and complex electrical drawings are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG180A Develop detailed and complex drawings for electrical systems using CAD systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0006 Develop detailed and complex drawings for electrical systems using CAD systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying graphical techniques to produce products, processes, systems or services design representations
- applying knowledge of complex electrical equipment design drawing methods, techniques, procedures and protocols and documenting design
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- developing a variety of detailed and complex electrical drawings
- incorporating feedback into final products
- interpreting and using technical data and specifications
- preparing to develop detailed and complex drawings for electrical systems
- presenting designs of electrical engineering products, processes, systems or services
- producing drafting documentation
- producing drawing sets
- selecting relevant computer-aided design (CAD) software tools, components, materials and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- managing resources
- relevant advanced CAD systems
- relevant CAD modelling techniques
- relevant computer-based modelling, design, drafting and application systems
- relevant graphical engineering design techniques for products, processes, systems or services representation
- relevant manufacturer specifications and operating instruction

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- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing detailed and complex drawings for electrical systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0007 Develop detailed electrical drawings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop detailed electrical drawings and documentation.

It includes preparing and developing detailed electrical drawing, and following documentation and workplace procedures.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are

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detailed electrical drawing		identified, obtained and applied
	1.2	WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3	Detailed electrical drawings are determined from the scope of work to be undertaken
	1.4	Electrical drawing details required for work to be undertaken are obtained from project specifications and in accordance with workplace procedures
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Software, tools and equipment for work are obtained in accordance with workplace procedures
2 Develop detailed electrical drawing	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Detailed electrical drawings design and layout requirements are determined from project specifications
	2.3	Technical data of electrical system components are interpreted to determine parameters included in the detailed electrical drawings
	2.4	Appropriate software tools are used to produce detailed electrical drawings based on workplace procedures
	2.5	Detailed electrical drawings are checked for accuracy in accordance with workplace procedures and project specifications
	2.6	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Complete detailed electrical drawing documentation	**3.1**	Completed detailed electrical drawings are submitted to appropriate person/s to be checked for accuracy in accordance with workplace procedures and project specifications
	3.2	Alterations, additions or correction instructions are followed and detailed electrical drawings are re-submitted for final approval
	3.3	Completed detailed electrical drawings are filed securely in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG179A Develop detailed electrical drawings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0007 Develop detailed electrical drawings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- completing detailed electrical drawings documentation and presenting preliminary and final drafts for verification, including:
  - applying, storing and retrieving data related requirements
  - digitising and scanning drafting/drawings products
  - producing related documentation for presentations
- preparing and developing detailed electrical drawings, including:
  - applying electrical equipment design drawing methods, techniques, procedures and protocols and documenting design
  - applying project specifications
  - interpreting and using technical data and specifications
  - producing drafting documentation
  - producing drawing sets
  - using advanced computer-aided design (CAD) systems and commands
  - using relevant drafting peripheral systems, equipment and tools to develop detailed drawings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- project specifications
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant software tools and equipment

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation and file storage, including digitising and scanning
- relevant workplace policies, procedures and instructions
- producing final drafts for verification, including:
  - principles, purpose and concept of verification of drafting products encompassing:
    - production of electrical drawings for verification by authorised persons, production of drawing sets, production of related documentation and presentations of final drafts
  - processes and procedures related to the verification of final drafts by authorised persons encompassing accuracy
  - publication of verified electrical drawings
- detailed electrical drawing production, including:
  - distribution branch circuits and boards, services and load calculations encompassing panels (high voltage (HV)/low voltage (LV))/switchboards/motor control centres/final
  - conductor/cable selection and calculations encompassing:
    - electrical, data and communications
  - overcurrent and overvoltage protection
  - cable support systems encompassing:
    - cable trays, trunking, conduits, ducts, guards, saddles, carriers, raceways/cavities and poles
  - box and fitting fill requirements
  - wiring devices and terminations
  - distribution equipment encompassing:
    - power circuit devices
  - distribution system transformers encompassing:
    - specialty transformers and power circuit devices
  - lighting applications encompassing:
    - lamps, ballasts and components
  - motors encompassing:
    - functional controls, advanced motor controls, motor calculations and motor maintenance arrangements
  - hazardous areas encompassing electrical equipment; classification of emergency standby systems encompassing uninterrupted power supply (UPS)/inverter and battery banks
  - fire alarm systems
  - HV terminations/splices
  - cable size selection for installation cable run
  - cable sizes, voltage drops, conduit sizes, fault levels, fuse/circuit breaker sizes and working temperatures
  - short circuit calculations
  - earth-loop impedance compliance test arrangements on the completed design
  - touch potentials calculations
  - cable schedules creation

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  - single line and as built drawings encompassing:
    - three phase schematic colour diagrams, marked up cable calculations, short circuit results and earth-loop impedance results
  - quantities parts list and drawings for tender drawings issued by electrical consultants/engineers
  - coordination and discrimination studies
  - building management systems (BMS), including:
    - building information modelling and sustainable design
  - fuse and circuit breaker trip curves, plots and displays
  - troubleshooting/fault finding
- detailed panel layouts, including:
  - detailed panel layouts creation
  - din rail tool
  - terminal strip editor
  - detailed panel layout annotation
  - detailed reports
- schematic component commands, including:
  - schematic symbols editor
  - schematic editor
  - components from lists
  - connectors
  - terminals: multiple level and jumpers
  - circuits
  - multiple phase circuits
- schematic editing, including:
  - advanced utilities
  - copy catalogue and location
  - values
  - swapping and updating blocks
  - using the auditing tools
  - update and retag drawings
- digitising and scanning, including:
  - drawings: digitisation - tablet and software configuration, tablet and puck, grids set-up and alignment marks for various size drawings, software parameters setting, and hard copy drawings digitisation to tablet parameters
  - digitised drawing editor, manipulation and save
  - digitise and grid set-ups and alignment marks on a hard copy of a large drawing (e.g. A1)
  - scanning devices and peripherals set-up encompassing associated software usage, save (e.g. file formats for use other software applications) and management
  - drawing hard copy scan
  - scanned image conversion to vector format, edit and save in file formats for use in CAD

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encompassing:

- importation of scanned images into CAD drawings in image formats for editing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0008 Evaluate and modify low voltage heating equipment and controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) heating equipment and controls.

It includes working safely, identifying faults in heating equipment, repairing heating equipment, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

or

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UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element
1 Prepare to work on heating equipment	**1.1** Scope of work is obtained from relevant documentation, electrical drawings or relevant person/s
	1.2 WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Evaluate and modify heating equipment	**2.1** Equipment and circuits are checked and arrangement identified
	2.2 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	2.3 The need to test or measure live work is determined in accordance with WHS/OHS requirements and, as necessary, conducted in accordance with workplace

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		procedures
	2.4	Fault/s and probable cause/s are identified from measured and calculated values as they apply to heating equipment
	2.5	Required components are identified and replaced in accordance with manufacturer specifications and industry standards
	2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	Justification for solutions used to modify circuits and equipment is documented
	4.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and modifying LV heating equipment and controls must include two of the following types of heating equipment and their controls:	• one single phase and one multi-phase from the following:
	  • space heating
	  • cooking
	  • water heating
	  • industrial process heaters

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Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0008 Evaluate and modify low voltage heating equipment and controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures, including:
  - identifying hazards, assessing risks and implementing control measures
- checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- determining the operating parameters of existing heating circuits and equipment
- testing the function of a thermostat
- calculating the heat energy in a simple heating process
- testing the operation of an over temperature cut-out of the safety thermostat
- altering existing heating circuits and equipment to comply with specified operating parameters
- selecting heating circuits and equipment to comply with a specified function and operating parameters
- determining the cause of low efficiency in existing heating circuit and equipment
- determining conditions causing an existing heating circuits and equipment to be unsafe
- connecting heating equipment and appliances
- identifying faulty components in heating appliances and controls from test results
- testing heating appliances and controls for serviceability
- ensuring all work complies with relevant Australian Standards and legislation
- completing work and documenting activities
- dealing with unplanned events/situations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical heating control devices, including:

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  - methods of manual heat control
  - methods of automatic heat control
  - types and application for common thermostats
  - operation of common thermostats, thermal cut-outs and pressure relief valves, flow switches and checking sacrificial anodes
  - sensitivity and differential of thermostats
  - techniques for testing a thermostat, including differential and correct operation
  - applications and operation of simmerstats
  - electronic heat control
- fixed electrical heating appliances, including:
  - terminology: heat energy, temperature, specific heat capacity, thermal conductivity and thermal stability
  - methods to test the heat energy in a simple heating process
  - methods of heat transfer
  - connections to a two phase stove
  - operation of reverse cycle air conditioning
- electrical water heater operation, including:
  - types of water heaters (instantaneous and storage) and their methods of control
  - intrinsic safety (pressure relief and thermal cut-out)
  - techniques for testing of over temperature cut-out of a thermostat
  - switchboard requirements to supply a controlled load water heater
  - internal circuit of a twin element water heater and supply connections
  - solar heating system and its integration into an electrical installation
  - heat pump
- faults in heating equipment and controls, including:
  - circuit diagrams of common heating equipment and controls
  - single phase and three phase element resistance values
  - techniques for testing single and three phase elements for correct insulation resistance and continuity
  - equipment replacement techniques
  - techniques for identifying and locating faulty components in heating equipment/controls
  - common types of faults
  - techniques for repairing/replacing faulty heating equipment components
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- relevant industry standards.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) lighting circuits, equipment and controls.

It includes working safely, identifying faults in luminaires and associated control equipment, repairing/replacing luminaire and control equipment components, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

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or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element
1 Prepare to work on lighting circuits	**1.1** Scope of work is obtained from relevant documentation, electrical drawings or relevant person/s
	1.2 WHS/OHS requiremetns and workplace procedures for a given work area are identified and applied
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Evaluate and modify lighting circuits	**2.1** Equipment and circuits are checked and arrangement identified
	2.2 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	2.3 The need to test or measure live work is determined in accordance with WHS/OHS requirements and when

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		necessary conducted in accordance with workplace procedures
	2.4	Fault/s and probable cause/s are identified from measured and calculated values as they apply to lighting equipment
	2.5	Required components are identified and replaced in accordance with manufacturer specifications and industry standards
	2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to modify circuits and equipment is documented
	3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and modifying lighting circuits, equipment and controls must be demonstrated in two of the following settings:	• commercial • industrial • domestic

Unit Mapping Information

No equivalent unit

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures, including:
  - identifying and assessing hazards and risks, and implementing control measures
- checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- determining the operating parameters of existing lighting circuits and equipment
- modifying existing lighting circuits and their controls to comply with specified operating parameters, including drawing and connecting lighting circuits that incorporate:
  - one-way
  - two-way
  - intermediate switching of light points using
- the loop at the light/switch methods of thermoplastic sheathed (TPS) wiring developing lighting circuits and equipment to comply with a specified function and operating parameters
- determining the cause of low illuminance level in existing lighting circuits and equipment
- determining conditions causing existing lighting circuits and equipment to be unsafe
- connecting lighting equipment and controls
- identifying faulty components in luminaires and auxiliary/control equipment from test results
- testing luminaires and auxiliary/control equipment for serviceability
- ensuring all work complies with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- loop at the light method of wiring lighting circuits
- loop at the switch method of wiring lighting circuits

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- installation methods of accessories and wiring for a lighting circuit incorporating one-way, two-way and intermediate switching of lighting points using the loop at the light/switch method of TPS wiring
- TPS cabling requirement for the loop at the light/switch circuit
- correct operation of the installed circuits including testing for compliance with industry standards
- emergency and evacuation lighting and lighting control, including:
  - factors and requirements of emergency and evacuation lighting concerning illumination levels, luminaire positioning and operating period
  - characteristics of maintained, non-maintained and sustained emergency lighting systems
  - arrangement of batteries in point and central bank emergency lighting supply systems
  - lighting control methods
- principles of lighting technology, including:
  - basic electrical terminology
  - colour theory
  - lighting techniques
- local Supply Authority requirements for maintaining high power factor
- terminology, principles and standards relevant to lighting (energy efficiency as per National Construction Code (NCC))
- types of luminaires:
  - different types of luminaires, their features and purpose
  - operation of different types of luminaires
  - expected lamp life, colour rendering and efficacy for typical types of different types of luminaires
- lighting circuits, equipment and controls used for the following applications:
  - commercial
  - industrial
  - domestic
- lighting layout in terms of visual comfort and relevant Australian Standards
- Australian Standards and local requirements for lighting
- light-emitting diode (LED) lighting and its applications
- Neon, Argon and Xenon lighting and their applications
- comparison of incandescent, low intensity discharge, high intensity discharge, LED and other types of lighting
- fire protection – residential fire and smoke alarms, including:
  - types of fire and smoke alarms
  - regulations and standards requirements regarding residential fire and smoke alarms
  - locations for residential fire and smoke alarms
  - wiring methods for residential fire and smoke alarms
  - operation of typical residential fire and smoke alarms
- identifying faults in luminaires and auxiliary/control equipment, including circuit and wiring diagrams of common lighting circuits, including:

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  - common fault symptoms and associated causes
  - common faults in luminaires and auxiliary/control equipment
  - techniques for repairing/replacing faulty lighting components
- input and output parameters of equipment incorporating electronic components for; controlling/switching lighting, controlling/switching motors, energy measurement and control, rectifying and inverting electrical supplies
- hazards and safety requirements related to equipment incorporating electronic components used in electrical systems
- relevant manufacturer specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0010 Evaluate and modify low voltage socket outlets circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) socket outlets circuits.

It includes working safely, identifying and repairing/replacing faulty socket outlets, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activitie

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

or

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UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element
1 Prepare to work on socket outlet circuits	**1.1** Scope of work is obtained from relevant documentation, electrical drawings or relevant person/s
	1.2 WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Evaluate and modify socket outlet circuits	**2.1** Socket outlets and circuits are checked and arrangement identified
	2.2 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	2.3 The need to test or measure live work is determined in accordance with WHS/OHS requirements and, as necessary, conducted in accordance with workplace

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		procedures
	2.4	Fault/s and probable cause/s are identified from measure and calculated values as they apply to socket outlet circuits
	2.5	Components are identified and replaced in accordance with manufacturer specifications and industry standards
	2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to modify circuits and equipment is documented
	3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and modifying LV socket outlets circuits must include at least two of the following socket outlets:	• single phase three pin socket outlets • three phase four pin socket outlets • three phase five pin socket outlets
Evaluating and modifying LV socket outlets circuits must include at least three of the following circuits:	• circuits supplying 10 A socket outlets • circuits supplying 15 A socket outlets • circuits supplying 20 A socket outlets • circuits supplying 32 A socket outlets

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Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0010 Evaluate and modify low voltage socket outlets circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures, including:
  - identifying hazards, assessing risks and implementing control measures
- checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- determining the operating parameters of existing socket outlets circuits
- altering existing socket outlets circuits to comply with specified operating parameters
- developing socket outlets circuits to comply with a specified function and operating parameters
- determining conditions causing existing socket outlets circuits to be unsafe
- installing circuits supplying a combination of socket outlets and equipment
- installing, terminating and testing of supported pendant outlets
- verifying correct operation of the installed circuits, including dead testing to comply with industry standards
- verifying the polarity of switched socket outlets
- identifying faulty socket outlets from visual inspection and/or test results
- ensuring all work complies with relevant Australian Standards and legislation
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- circuits for socket outlets, including:
  - different types of socket outlets and their purpose
  - requirements concerning the polarity of switched socket outlets
  - techniques for checking for phase rotation for three phase outlets

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  - correct cable size to supply 10 ampere (A), 15 A, 20 A and 32 A socket outlets (single and three phase) for given installation conditions
  - verifying number of socket outlets connected to a 16 A and 20 A circuit breaker in accordance with industry standards
  - installation methods of single phase socket outlet circuits
  - correct operation of the installed circuits, including dead testing for correct in accordance with industry standards
  - circuit protection and residual current device (RCD) requirements for socket outlets circuits
  - use of cable support systems for pendant outlets
  - socket outlets for vehicle charging
- final sub-circuits and segregation, including:
  - purpose of mixed circuits
  - circuit loading for a mixed circuit
  - purpose of segregation of circuits and the AS/NZS 3000 requirements
  - installation methods a single phase mixed circuit
  - verifying correct operation of the installed circuits, including testing for correct compliance with industry standards
- identifying faults in socket outlets circuits including:
  - circuit diagrams, wiring diagrams, cable schedules and specifications of socket outlets circuits
  - common fault symptoms and associated causes
  - common faults in socket outlets circuits
  - techniques for locating and repairing/replacing faulty socket outlets
  - methods to determine the cause of RCD operation in a socket outlets circuits
- hazards and safety requirements related to equipment incorporating electronic components used in electrical systems
- relevant manufacturer specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance

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Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0011 Evaluate performance of low voltage electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate performance of low voltage (LV) electrical apparatus.

It includes preparing evaluations, determining performance requirements, inspecting and setting up performance tests, evaluating inspection and test results and documenting test outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical devices and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate electrical apparatus	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Inspection and testing area are checked for safety hazards and risk control measures implemented in accordance with WHS/OHS and workplace procedures
	1.4 Relevant documentation is obtained and interpreted to identify the certification/approval specifications of the electrical apparatus to be assessed.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.6 Tools, testing devices and materials required for work are obtained and checked for correct operation and safety
2 Evaluate electrical apparatus	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 The need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits/apparatus/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Assessment process of electrical apparatus performance requirements and testing methods applied are in accordance with relevant industry standards and workplace procedures
	2.5 Apparatus inspection and test methods for relevant parameter/s are prepared in accordance with workplace procedures and relevant person/s advised
	2.6 Apparatus inspection and tests are carried out in accordance with workplace procedures and results

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		documented
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Assessment is carried out without damage to systems circuits, environment and/or services using sustainable energy practices
3 Complete work and document evaluated results	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Inspection and test results are evaluated and non-compliance issues identified in accordance with workplace procedures
	3.4	Inspection and test results and comments on non-compliance issues are documented and reported to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Reporting performance of two different electrical apparatus must include at least the following:	• WHS/OHS • electrical safety • ergonomic operation • testing against specification • fit for purpose • sustainable energy principles

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG131A Evaluate performance of low voltage electrical apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0011 Evaluate performance of low voltage electrical apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- checking and isolating circuits/machines/plant
- dealing with unplanned situations in accordance with workplace procedures and safe work practices
- evaluating electrical apparatus
- identifying non-compliance defects
- interpreting compliance documents of equipment for assessments
- obtaining and checking tools, testing devices and materials required for work
- preparing to evaluate electrical apparatus
- reporting inspection and test results and non-compliance issues
- requesting advice and coordinating work with relevant person/s
- setting up and conducting appropriate inspections and tests of electrical apparatus
- testing and measuring live work environments
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant electrical machines and performance monitoring
- relevant machine inspection and test methods
- relevant manufacturer specifications and operating instructions
- relevant performance standards and regulatory requirements for electrical equipment
- relevant job safety assessments or risk mitigation processes

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- relevant tools, testing devices and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to evaluating performance of electrical apparatus
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit includes the installation of wiring enclosures, cable support systems, cables, protection devices, switchgear, control gear, switchboards, and accessories designed to operate at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It covers working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories, matching appliances and accessories with that specified, making required circuit connections and completing the necessary installation documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and select cables for low voltage electrical installations

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UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install low voltage (LV) wiring, appliances, switchgear and associated accessories	**1.1** Nature and location of work is determined from workplace documentation, drawings or relevant person/s to determine the scope of work
	1.2 WHS/OHS requirements and workplace procedures are applied
	1.3 Risks are identified and control measures implemented in accordance with workplace procedures

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	1.4	Need to test or measure live work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	1.5	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures.
	1.6	Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s
	1.7	Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements
	1.8	Material required for installation work is obtained in accordance with workplace procedures and checked against job specifications
	1.9	Tools, equipment and measuring devices required for the installation and work environment are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10	Preparatory work is inspected and checked to ensure no damage has occurred and compliance with job specifications
2 Install LV wiring and associated accessories	**2.1**	Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements
	2.2	Accessories are installed straight and square in the required locations and within acceptable tolerances
	2.3	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.4	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken
	2.5	Defects revealed through on-going compliance and safety inspection and tests are rectified

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	2.6	Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment using sustainable energy practices
	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person
3 Install and connect LV appliances, switchgear and associated accessories	**3.1**	Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance
	3.2	Accessories are installed straight and square in the required locations and within acceptable tolerances
	3.3	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements
	3.4	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken
	3.5	Defects revealed through on-going compliance and safety inspection are rectified
	3.6	Installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
	3.7	Unexpected situations are dealt with safely and with the approval of an authorised person
4 Complete work and document activities	**4.1**	WHS/OHS work completion risk control measures and procedures are followed
	4.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	'As-installed' cables/wiring, appliances, switchgear and accessories are documented and an appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing LV wiring, appliances, switchgear and associate accessories must include:	• installing and connecting main switches, protective devices and links on a main switchboard and preparing the switchboard for the installation of metering • installing, modifying and testing electrical installations and equipment for construction and demolition sites • installing and connecting a switchboard • socket outlets • lighting equipment and accessories • luminaires
Installing LV wiring, appliances, switchgear and associate accessories must also include least four of the following:	• cooking appliances • smoke and fire detectors • water heaters and controls • three phase motor starter and control switches • fixed electric heating system (room heaters) • transformers • appliances producing hot water or steam • electric heating cables for floors and ceilings • trace heating • duct heaters • electricity converters • capacitors • batteries • gas appliances and equipment • air conditioning and heat pump systems • lifts
Wiring systems, enclosures and supports must include at least three of the following:	• metallic conduit • non-metallic conduit • trunking • duct • cable tray/ladder • catenary

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Cable types used for wiring systems must include at least four of the following:	• posts/poles/struts • thermoplastic insulated (TPI) cable • flat thermoplastic sheathed (TPS) • circular TPS • steel wire armoured • fire rated cable • flexible cables
Purpose of wiring system circuits must include:	• consumer mains • sub-mains • single phase final sub-circuit • three phase final sub-circuit

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- reading and interpreting drawings and schedules related to cable layouts, apparatus locations and circuit connections
- planning cable routes and installation of appliances, switchgear and accessories and obtaining installation materials
- identifying underground services
- selecting underground consumers mains in accordance with AS/NZS 3000 and local supply authority requirements
- sequencing the installation effectively with other relevant people
- installing and terminating consumer mains for connection via overhead terminals and underground
- installing of non-metallic and metallic conduit, trunking and duct enclosures and cable ladder/tray
- installing wiring systems for low voltage (LV) circuits
- routing, placing and securing cables in accordance with industry standards
- installing LV electrical apparatus and associated equipment
- selecting equipment suitable for installation in given damp situations
- placing and securing appliances, switchgear and accessories accurately in their planned location
- terminating cables and conductors, including aerial types in accordance with industry standards
- terminating subcircuit cabling at switchboards and connecting components including:
  - correct interconnection between switchgear, protection devices and links'
  - use of adequately sized cables
  - correct marking of equipment
  - clear identification of circuit neutral conductors
- terminating and connecting appliances, switchgear and accessories in accordance with industry standards
- conducting safety inspection, testing and documentation of installed circuits, including verification of earth continuity, insulation resistance, polarity, circuit connections and

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protection arrangements
- maintaining fire integrity.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- standards, codes and requirements applicable to the installation of wiring systems and electrical equipment, including:
  - cables and methods of mechanical protection and support
  - techniques for protection against and from other services
  - identifying prohibited cable locations
  - identifying systems with alternate supplies
  - building codes affecting the installation of cables and current-using carrying equipment and accessories in buildings, structures and premises, including limitation on penetration of structural elements, maintenance of fire protection integrity, requirements for emergency/safety services and wiring above suspected ceilings
  - issues affecting electrical installations in heritage buildings and premises (limitation on penetration of structural and finished elements, accessing cable routes, types and colour of exposed accessories)
  - techniques for protection against thermal effects
  - required and permitted locations of current-using equipment and accessories
  - control, switching, overcurrent and residual current device (RCD) protection
  - equipotential bonding in accordance with AS/NZS 3000 and local supply authority requirements
  - sizing of wiring enclosures based on space factor recommendations of AS/NZS 3000 Wiring Rules
- techniques for installing cables and wiring systems, including:
  - typical cable routes through buildings, structures and premises
  - application of wiring accessories
  - drawing-in, placing and fixing of cables
  - cable and conductor terminations
  - methods of maintaining fire rating integrity
  - techniques for inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply
  - connection of electrical equipment and terminal configuration for connection of phase, neutral and protective earthing conductors for the following types of equipment:
    - heating
    - lighting and smoke detectors
    - motors
    - transformers

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    - switchgear and accessories pendant socket outlets
    - appliances.
- termination of subcircuit cabling at switchboards and connection to components including:
    - correct interconnection between switchgear, protection devices and links'
    - correct preparation for fitting and connection of local supply authority equipment
    - use of adequately sized cables
    - correct marking of equipment
    - clear identification of circuit neutral conductors
    - correct polarity
    - safe removal of equipment and termination of unused cable
- varied and additional standards and requirements for special situations, including:
    - patient treatment areas
    - marinas and boats at LV
    - transportable structures and vehicles and their site supplies
    - shows and carnivals
    - systems with alternate supplies
- methods for the installation, modification and testing of electrical installations and equipment for construction and demolition sites, complying with AS/NZS 3012 and applicable workplace safety legislation including:
    - supply requirements
    - switchboards for the purpose of construction and demolition
    - protection of circuits
    - construction wiring
    - lighting
    - socket outlets
    - circuits for lifts
    - calibration of instruments
    - inspection and testing methods
    - initial and periodic inspection and testing
- identifying hazardous areas, including:
    - additional training required to work competently with electrical equipment for hazardous areas
    - nature of areas classified as a hazardous area
    - responsibility for classifying a hazardous area
    - awareness of standards called up by the Wiring Rules for selection, installation, inspection and maintenance of electrical equipment and installations in hazardous areas AS/NZS 3000 requirements for hazardous areas
- requirements for the installation of cables and accessories in damp situations and extra-low voltage (ELV) installations, including:
    - restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations

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  - techniques for selecting equipment suitable for installation in given damp situations
  - voltage range that defines ELV
  - use of RCDs for damp situations
  - separated extra-low voltage (SELV) system and a protected extra-low voltage (PELV) system
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements for selecting ELV systems and devices for a range of installations and conditions
  - equipotential bonding in showers, bathrooms, swimming and spa pools
- installation of aerial conductors and underground wiring including:
  - AS/NZS 3000 requirements
  - types and application of aerial conductors
  - aerial span limitations and required clearances
  - selection of aerial supporting poles/post and struts for a given application
  - use and requirements of catenary support systems
  - acceptable cable types and protection for underground wiring categories
  - underground wiring depth and protection
  - underground wiring clearances from other services
  - techniques for termination of aerial cables
  - techniques for testing of installed cables in compliance with Australian Standards
  - install unprotected consumer's mains to reduce the risk of short-circuit to a minimum
- hazards and safety requirements related to equipment incorporating electronic components used in electrical systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0013 Install, set up and commission interval metering

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to the install, set up and commission interval meter for measurement of energy use by consumers.

It includes working safely in planning, installing and setting up interval electricity meter, and completing the necessary service metering documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and select cables for low voltage electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install interval meter	**1.1** WHS/OHS requirements and workplace procedures, for a given work area, are identified and applied
	1.2 Health and safety hazards are identified, risks assessed and risk control measures and workplace procedures implemented in preparation for the work
	1.3 Safety hazards not previously identified are noted on job safety assessments and existing risk control measures implemented
	1.4 Switchboard on which the meter is to be installed is inspected and evaluated for compliance with safety,

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		functionality and industry standards
	1.5	Approval to rectify safety and/or functionality defects of the switchboard is sought from relevant person/s in accordance with workplace procedures
	1.6	Electrical meter installation and/or rectification work is prepared in consultation with relevant person/s effected by the work and sequenced appropriately
	1.7	Materials needed for meter work are obtained in accordance with workplace procedures and checked against job requirements and specifications
	1.8	Tools, equipment and testing devices needed for meter work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Install interval meter	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
	2.3	Existing meter is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Approved rectification work is carried out to comply with industry standards and in accordance with workplace procedures
	2.5	Meter is installed to comply with relevant technical industry standards, job specifications and requirements
	2.6	Meter power and communication connections are made in accordance with manufacturer specifications, functional and regulatory requirements
	2.7	Meter operating parameters are set in accordance with manufacturer specifications, functional and regulatory requirements
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment and with the approval of an authorised person/s
	2.9	Ongoing checks of the quality of installed apparatus are

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		undertaken in accordance with workplace procedures
	2.10	Meter installation is carried out efficiently without unnecessary waste of materials or damage to apparatus circuits, the surrounding environment or services using sustainable energy principles
3 Complete and report meter installation activity	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed and supply is reinstated to the installation in accordance with regulator and industry standards
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final inspection and tests are made to ensure the installed meter conforms to job requirements
	3.4	'As-installed' meter or rectification work is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing interval electricity meters must include the following:	• a single phase interval meter • a two-way interval meter • an interval meter where compliance rectification work is required

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG171A Install, set up and commission interval metering.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0013 Install, set up and commission interval metering

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting meter installation activities
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining prospective fault-current switchboard form types
- installing, setting up and commissioning interval electrical meters, including:
  - carrying out preparation work effectively
  - documenting meter and rectification work and notifying appropriate person/s in accordance with workplace procedures
  - following workplace procedures to obtain approval to rectify non-compliance aspects of the switchboard
  - inspecting and evaluating safety and functionality compliance of the switchboard accurately
  - locating of switchboards and arrangement of switchboard equipment in installations
  - making power and communications connections in accordance with manufacturer specifications and functional and regulatory requirements
  - placing and securing meter correctly
  - rectifying compliance defects
  - reinstating supply to the installation safely in accordance with workplace procedures
  - setting meter parameters in accordance with manufacturer specifications and functional and regulatory requirements
- planning to install interval electrical meters.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- current industry practices and technologies
- interval meter concepts and installation, including:
  - classes of meter types, functions, and construction from a block diagram
  - communication methods and arrangements
  - importing and exporting energy
  - installation and power connection arrangements and connections for gas metering
  - purpose, types and applications
  - single and polyphase meters and procedures for setting meter parameters
- meter layouts and requirements, including:
  - accessibility and restricted locations of switchboards
  - arrangement and identification of switchboard equipment
  - arrangement and installation of meter equipment
  - construction requirements of switchboards
  - identification of main switchboards
  - meter equipment
  - protection against switchboard internal arc faults
  - purpose, types and applications
  - switchboard wiring and fire-protective measures
  - varying arrangements for meter and meter layouts
- reasons for meter and the regulated market, including regulations
- relevant industry technical standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant state/territory regulator interval metre commissioning requirements and specifications
- relevant WHS/OHS legislated and regulation requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used should reflect current industry practices in relation to installing and setting up interval meters
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to isolate, test and troubleshoot electrical circuits operating at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes working safely, isolating electrical circuits, evaluating low voltage (LV) electrical circuits, applying systematic fault-finding procedures, conducting repairs and completing the necessary documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical circuits and equipment which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

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UEEEL0025 Test and connect transformers

UEEEL0047 Identify, shut down and restart systems with alternate supplies

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to isolate, test and troubleshoot electrical circuits	**1.1** Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s
	1.2 WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.3 Electrical hazards are identified, risks are assessed, and control measures are implemented
	1.4 Relevant industry standards, regulation, legislation and workplace procedures are identified and applied
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
2 Apply safe isolation, lock-out and tag-out procedures	**2.1** Electrical circuits and conductors, all of their energy sources, and isolation points are identified

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	2.2	Electrical circuits are isolated from all energy sources and secured in accordance with industry and regulatory standards
	2.3	Safe isolation from all sources of energy is confirmed
	2.4	Isolation is secured using appropriate devices, tags, lock-out or permit system
	2.5	Any stored energy is discharged and deenergisation proved
	2.6	Unused conductors and equipment are dealt with in accordance with regulatory requirements
3 Conduct compliance inspection and testing on electrical circuits	**3.1**	Electrical circuits are visually inspected for compliance with regulatory requirements
	3.2	Mandatory tests are identified, including sequence of tests and equipment required
	3.3	Continuity of the earthing system is tested for compliance with regulatory requirements
	3.4	Insulation resistance of the circuit is tested for compliance with regulatory requirements
	3.5	Polarity of the circuit is tested for compliance with regulatory requirements
	3.6	Correct circuit connections is tested for compliance with regulatory requirements
	3.7	Alternative supply systems are inspected and tested for compliance with industry and regulatory standards
	3.8	Earth fault loop impedance is verified for compliance with regulatory requirements
	3.9	Operation of residual current devices (RCDs) is tested for compliance with regulatory requirements
	3.10	Compliance test results are documented and reported in accordance with industry and workplace requirements
	3.11	Non-compliances are identified and reported to relevant personnel

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	3.12	Requirements for the verification of circuits are completed in accordance with regulatory requirements
4 Locate, identify and repair faults in electrical circuits	**4.1**	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance WHS/OHS requirements and procedures
	4.2	Safety hazards resulting from the fault or breakdown are documented and risk control measures identified and implemented in consultation with appropriate person/s
	4.3	Troubleshooting of electrical circuits is undertaken methodically using measured and calculated values of circuit parameters
	4.4	Circuit components are dismantled and parts stored to protect against loss or damage
	4.5	Faulty circuits/components are rechecked and their fault status identified
	4.6	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	4.7	Effectiveness of the repair is tested in accordance with workplace procedures
	4.8	Circuit is reassembled, tested and prepared for return to service
	4.9	Unexpected situations are dealt with safely and with the approval of authorised person/s
	4.10	Troubleshooting and repair activities are carried out without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices
5 Complete work and document activities	**5.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	5.2	Work area is cleaned and made safe in accordance with workplace procedures
	5.3	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit must be demonstrated with circuits and equipment operating at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.) and must include:

Isolating, testing and troubleshooting LV electrical circuits and equipment must include safe isolation, visual inspection and mandatory testing of the following in accordance with industry standards, including one equipment type that has a dual supply, one circuit breaker and one high rupturing capacity (HRC) fuse:	• at least one of the following:
	  • main switchboard
	  • distribution board
	and
	• at least three of the following:
	  • motor
	  • space heater
	  • water heater
	  • lights
	  • socket outlets

Locating and diagnosing LV electrical circuit and equipment faults must include at least four of the following common faults in electrical circuits:	• open circuit • short circuit • incorrect connections • insulation failure • unsafe condition • equipment/component failure • related mechanical failure

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures, including:
  - identifying and assessing hazards and risks, and implementing control measures
- selecting and using correct tools and equipment to isolate, test and troubleshoot electrical circuits
- performing safe isolation of equipment, including:
  - preparing a safe work method statement (SWMS) or job safety analysis (JSA) for effective and safe isolation
  - applying safe methods to identify sources of supply to be isolated
  - identifying appropriate points of isolation
  - isolating equipment from all sources of supply by safely switching off switches or circuit breakers, removing fuses or links, or removing circuit connections
  - securely isolating devices by applying an isolation securing device which requires a deliberate action to engage or disengage
  - applying a personal danger tag, lock-out or permit system
  - applying safe methods to confirm effective and safe isolation from all sources of supply
  - identifying the limits of the safe work area
  - discharging any stored energy
  - proving deenergisation of all relevant electrical equipment and conductors, including:
    - testing the voltage tester on a known live source
    - testing between all conductors and a known earth
    - testing between conductors
    - retesting the voltage tester on a known live source for correct operation
- correctly using personal protective equipment (PPE) whilst performing effective isolation and operation of low voltage (LV) equipment
- completing visual inspection of the electrical installation for compliance with regulatory requirements including:
  - protection requirements

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    - general condition
    - mains/sub-mains
    - switchboards
    - wiring systems
    - equipment and accessories
    - earthing
- conducting mandatory testing to ensure:
    - compliance with AS/NZS 3000 mandatory test requirements and the application of mandatory tests following guidance of AS/NZS 3017
    - insulation resistance of mains, sub-mains and final sub-circuits meets the regulatory requirements
    - earth continuity of the main earthing conductor, protective earthing conductors, combined protective earthing and neutral (PEN) conductors and bonding conductors meet the regulatory requirements
    - polarity of active, neutral and earth conductors including phase sequence and rotation meet the regulatory requirements
    - correct connections of active, neutral and protective earthing conductors are tested to ensure no short circuits between conductors, no transposition of conductors that could result in the earthing system or exposed conductive parts becoming energised, and no interconnection of conductors between different circuits, in accordance with regulatory requirements
    - verification that earth fault-loop impedance limitations are not exceeded in accordance with regulatory requirements
    - residual current devices (RCDs) have been correctly installed, their function verified, and the isolation of all switched poles verified, in accordance with regulatory requirements
- testing and verifying alternate supplies, including:
    - completing continuity and voltage testing, including output voltage of device/s
    - earth resistance testing, including:
        - continuity of main earthing conductor
        - checking earth bonding integrity and equipotential bonded parts
    - insulation resistance test
    - polarity and checking operation of control device/s
- verifying records for the date of initial certification are completed in accordance with regulatory requirements
- locating and diagnosing common faults in electrical circuits
- testing and diagnosing high impedence or open circuit neutral fault
- repairing and/or replacing parts to rectify faults in accordance with AS/NZS 3000
- applying steps required to ensure the fault does not re-occur
- completing final testing and re-commissioning
- completing work and documenting activities.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safety procedures for working on electrical systems, circuits and equipment
- safe working practices as a normal part of carrying out electrical installation work
- tools and equipment needed to conduct electrical installation compliance inspection and testing
- legislation and regulations that require circuits and equipment to be inspected and tested to ensure they are safe
- the person/bodies responsible for the various aspects of ensuring electrical installations are safe
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use
- results of periodic inspection and tests that show electrical equipment are safe to use
- visual inspection of the electrical installation for compliance with regulatory requirements, including:
  - protection requirements
  - general condition
  - mains/submains
  - switchboards
  - wiring systems
  - equipment and accessories
  - earthing
- regulatory requirements related to compliance testing, including:
  - insulation resistance of mains, sub-mains and final sub-circuits
  - earth continuity of the main earthing conductor, protective earthing conductors, combined protective earthing and neutral (PEN) conductors, and bonding conductors
  - polarity of active, neutral and earth conductors including phase sequence and rotation
  - correct connections of active, neutral and protective earthing conductors are tested to ensure no short circuits between conductors, no transposition of conductors that could result in the earthing system or exposed conductive parts becoming energised, and no interconnection of conductors between different circuits
  - earth fault-loop impedance in both 'supply available' and 'no supply available' scenarios
  - correct installation of RCDs, verification of their function, and verification of isolation of all switched poles
  - testing requirements where multiple/alternate supplies are present, including anti-islanding
- AS/NZS 3000 requirements for dealing with unused conductors and equipment
- importance of the MEN link when a fault occurs.
- likely consequences of the absence of the MEN link or high impendence in the PEN conductor when a fault occurs

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- requirements for installation of an MEN link in an installation and an outbuilding
- safety implications of high impedance or open circuit neutral faults
- ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device
- tests that show all circuits and equipment operate as intended
- results of tests conducted on an installation to comply with requirements and ensure the installation is safe
- documentation of periodic testing and inspection of electrical equipment, including tagging requirements in accordance with AS/NZS 3760
- techniques and procedures for the effective safe isolation of any equipment, including:
  - preparation of a SWMS or JSA for effective safe isolation
  - safe methods for identifying source of supply to be isolated, including alternate supplies
  - switching-off, lock-out and tagging procedures
  - safe methods for confirming effective and safe isolation of all energy sources
  - industry standards related to isolation
- techniques and procedures for testing and verification of alternate supplies, including:
  - purpose of tests, testing methods and equipment
  - use of continuity and voltage testing meters
  - direct current (d.c.) polarity, including switching and protection equipment
  - earthing arrangements
- troubleshooting concepts, including:
  - need to understand the correct operation of a circuit or equipment, switching and control circuit arrangements
  - common faults with circuits and equipment, including:
    - operator faults
    - incorrect connections
    - open circuits
    - short circuits
    - device faults (mechanical)
    - equipment/component failure
    - supply faults
    - insulation failure
    - unsafe conditions
    - earth leakage
  - typical fault symptoms and their causes, including:
    - operation of circuit protective device
    - appliance does not operate
  - factors to consider in clarifying the nature of a fault, including:
    - initial fault report
    - confirmation of symptoms of the fault
    - comparison of symptoms with normal operation

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  - methods for testing ,including:
    - visual inspection
    - component isolation
    - test equipment
    - sectional testing
  - dealing with intermittent faults (vibration, shock, changes in temperature and electromagnetic interference)
  - final testing and re commissioning
- hazards and safety requirements related to equipment incorporating electronic components used in electrical systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a the appropriate licence for the jurisdiction to undertake the work being assessed.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated), unless prohibited by regulation, before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0015 Manage large electrical projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage large electrical projects.

It includes identifying the scope of the project; managing safety, budget variation, personnel, resources and critical path timelines; and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify the scope of the project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Project deliverables and budget are identified from project planning, relevant documentation and discussions with relevant person/s

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	1.3	Measurable outcomes are identified to evaluate the project on completion from project planning and relevant documentation
	1.4	Plant, materials and skills required to meet project outcome are identified from project planning and relevant documentation
	1.5	Processes and workplace procedures are developed for managing contract variations from discussions with relevant person/s and in accordance with contractual agreement
2 Manage project within scope	**2.1**	WHS/OHS requirements, workplace procedures and programs are implemented and monitored
	2.2	Achievement of project outcomes is delegated to relevant person/s involved in the project
	2.3	Risk events are identified and project plan strategies implemented to ensure the outcomes are achieved to a safety and quality standard in accordance with contractual agreement and workplace procedures
	2.4	Procurement processes are monitored to ensure supply of plant and materials in accordance with workplace procedures
	2.5	Project progress is monitored in accordance with schedule, quality requirements and budget
	2.6	Conflict issues on worksite, between stakeholders, clients and regulators are identified and managed in accordance with workplace procedures
	2.7	Variations are managed in accordance with workplace procedures and contractual agreement
	2.8	Project records are maintained and progress reports written and forwarded to all relevant person/s
3 Complete project and relevant documentation	**3.1**	Project outcomes, plan, implemented risk strategies, contract variations, safety record and budget are evaluated in accordance with contractual agreement and workplace procedures
	3.2	Project completion and acceptance is sought from relevant person/s with relevant documentation in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG169A Manage large electrical projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0015 Manage large electrical projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- establishing the scope of the project accurately
- ascertaining the input of a project
- developing effective management processes
- managing resources and variations effectively
- resolving conflicts
- adopting risk management strategies
- maintaining records and submitting progress reports
- meeting project outcomes
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- completing project
- identifying plant, materials and skills for project.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical project management, including:
  - defining project parameters encompassing:
    - project scope
    - project stakeholders and clients
    - project phases and the relationship between phases
    - time requirements and limitations
    - resource requirements and limitations
    - quality requirements and limitations
  - time-management concepts and standard practices
  - financial management encompassing:

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    - financial management concepts
    - standard practices for managing project finances
    - project budgets
    - costs
    - variations and estimations
    - invoicing against project phases/deliverables
    - acquittals
- quality management concepts and practices
- human resource management concepts and practices within a project
- communication management concepts and practices within a project
- risk management and contingencies encompassing:
    - risk management concepts, including:
        - internal risks
        - external risks
        - contingencies
        - standard practices for managing risk within a project
        - risk minimisation
        - risk removal
- procurement management concepts and practices
- physical resource management concepts and practices relating to equipment, technology, information and facilities
- contracts encompassing:
    - contract format
    - contract content
    - interpreting contract clauses
    - legal obligations of contract parties
    - working to contract specifications
    - documentation accompanying contracts, such as schedules
- performance assessment and continuous improvement
- engineering ethics principles
- customer/client relations encompassing:
    - importance of customer/client relations
    - interpersonal skills that enhance customer/client relationships
    - dispute resolution
    - customer/client relations strategies
- electrical industry sector customs and practice encompassing:
    - equipment procurement, cost-benefit analysis and performance testing
    - typical approaches to planning and management
    - successful planning techniques
    - best practice management methods and styles

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- problem-solving techniques
- relevant manufacturer specifications and operation instructions
- relevant plant, materials and skills
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to managing electrical projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0016 Provide advice on effective and energy efficient lighting products

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to advise customers on effective and energy efficient lighting products within the scope of manufacturer product information.

It includes planning and providing lighting principles, light source types and typical lighting applications advice. It also includes interpreting manufacturer technical information and documenting advice given.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to advise on effective and efficient lighting products	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Appropriate questioning and active listening are used to clarify and respond to lighting product enquiry
	1.3	Lighting documentations/files that will assist in providing necessary advice are read, reviewed and understood
2 Provide advice on effective and efficient lighting products	**2.1**	WHS/OHS risk control measures and workplace procedures are followed
	2.2	Lighting product information is identified, and manufacturer product data is read and applied to provide relevant product advice
	2.3	Technical or costing inquiries are referred to appropriate person/s in accordance with workplace procedures
	2.4	Inquiries and response are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing advice on lighting products must include the following:	• three different lamp types
	• three optical functions and fitting design of the following luminaires:
	  • light distribution
	  • luminaires for indoor and outdoor use
	  • modern technology applied to luminaries
	  • mounting techniques

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG181A Provide advice on effective and energy

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efficient lighting products.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0016 Provide advice on effective and energy efficient lighting products

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- planning and providing advice on lighting products, including:
  - determining the nature and scope of the advice required
  - documenting inquiries and responses in accordance with workplace procedures
  - referring technical and costing inquiries to appropriate person/s
  - reviewing relevant lighting product documentation and providing appropriate product advice
- using oral communication skills/language, including:
  - active listening
  - asking for clarification/feedback
  - questioning
  - seeking advice from supervisor/appropriate person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- current industry standards, practices and technologies, including:
  - classification of light distribution and beam spread
  - electrical function and components appropriate for the insulation class or extra-low voltage (ELV) fault protection, including supply terminals, lamp holder(s), electrical ancillaries when needed and appropriated internal wiring
  - fluorescent lamps types and principles

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  - high intensity discharge (HID) lamps
  - illumination and lighting principles
  - incandescent lamp types and principles
  - ingress protection (IP) ratings and examples of their application to luminaires
  - light-emitting diode (LED) lamps types and principles
  - light distribution and reading a polar luminance distribution curve
  - light output ratio of common typical luminaires without and with reflector and diffuser mechanisms
  - lighting technology
  - luminaires (light fittings) types and principles
  - mechanical function and components (including IP rated enclosure with suitable mounting arrangement, mechanisms to accommodate lamp(s), electrical ancillaries when needed, optical system and excessive temperature rise)
- technology of light, including:
  - electromagnetic spectrum and visible (frequency/wavelength) range
  - light output from a source, including luminous flux, and efficacy of different types of lamps
  - terms, units, definitions, and symbols used for:
    - light intensity and the relationship with luminous flux
    - illuminance and the relationship with luminous flux and environmental factors
    - luminance and the relationship with luminous intensity and illuminance
  - significance of inverse square law on illuminance
  - vision and illuminance standards for particular environments and activities
- nature of light, including:
  - colour rendering, colour distortion, colour temperature scale and the perceived colour of a light source
  - comparison of the colour spectrum of sunlight and light generated from different lamp types
  - frequency and colour that light is perceived, including primary and additive colours
- incandescent lamps, including:
  - application, types, principles, common power ratings and features, including envelope, filament type and temperature (K), fill gas and cap
  - effect of filament evaporation over time and parameters (ϕ, η, P, hr) with variations in rated voltage
- fluorescent lamps, including:
  - application
  - compact fluorescent (CFL) types, including integrated and non-integrated ballasts, form, and rating for equivalent light out of general lighting service (GLS) lamp
  - expectations (efficacy [l/w]; visual ambience [K]; visual satisfaction [CRI] and life [hr])
  - type T accessories, including the basic operation, features and advantage of the electromagnetic ballast; and starter capacitor

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  - type T series, including the basic principle, double and single phosphor coating and colour rendering index (CRI)
- high-intensity discharge (HID) lamps, including:
  - application
  - mercury lamp types, including blended and high-pressure (HP)
  - metal halide lamp, including principles, structural features, lamp forms, spectral intensity and CRI
  - structural features and spectral intensity
- LED lamps, including applications, types, structural features, spectral intensity and CRI
- optical function and components, including a variety of mechanism to distribute light, direct light, filter light and/or limit glare; and maximum possible light output ratio
- relevant luminaires for indoor and outdoor applications
- types and features of indoor luminaires, including light distribution, symmetry, screening and utilisation factor
- luminaires - light fittings, including:
  - classification of light distribution and beam spread
  - electrical ancillaries when needed, including optical system and excessive temperature rise
  - electrical function and components that must be appropriate for the insulation class or ELV fault protection, including supply terminals, lamp holders, electrical ancillaries when needed, and appropriated internal wiring
  - examples of currently available luminaires for indoor and outdoor applications
  - IP ratings and examples of their application to luminaires
  - light distribution and reading a polar luminance distribution curve
  - light output ratio of common typical luminaires without and with reflector and diffuser mechanisms
  - mechanical function and components for IP rated enclosure with suitable mounting arrangement; mechanisms to accommodate lamps
  - optical function and components, including a variety of mechanisms to distribute, direct, and filter light and/or limit glare to achieve the maximum possible light output ratio
  - types and features of indoor luminaires, including light distribution, symmetry, screening and utilisation factor
  - types and features of outdoor luminaires, including types of light distribution and reflector control
- interpersonal and communication skills, including listening, questioning and receiving feedback
- relevant job safety assessments or risk mitigation processes, including safe working practices
- relevant lighting manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions
- sustainable energy principles and practices.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0017 Repair and maintain mechanical components of electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and maintain mechanical components of electrical machine.

It includes working safely to industry standards in planning and repairing/maintaining mechanical components of electrical machines and documenting workplace activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0004 Carry out basic repairs to electrical components and equipment

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1 Prepare to repair mechanical components	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2	Existing WHS/OHS risk control measures and workplace procedures are followed in preparation for the repair work
	1.3	Safety hazards not previously identified are reported on job safety assessments, risks assessed and risk control measures sought from work supervisor
	1.4	Nature of repair work is obtained from workplace documentation or from work supervisor to determine scope of work to be undertaken
	1.5	Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.6	Sources of materials required for work are determined in accordance with workplace instructions and procedures
	1.7	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
	1.8	Appropriate machine is selected, checked for safety and prepared for any necessary machining operation
	1.9	Cutting tools are selected, sharpened and set-up for each machining operation
2 Repair mechanical components	**2.1**	Existing WHS/OHS risk control measures and workplace procedures are followed
	2.2	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Component being machined is positioned and clamped in accordance with workplace procedures
	2.4	Machining is carried out safely and to suit the mechanical component and material being machined in accordance with safe work practices and workplace procedures
	2.5	Measurements are taken and confirmed to ensure repairs comply with technical industry standards, job

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		specifications and workplace requirements
	2.6	Mechanical components are repaired in accordance with technical industry standards, job specifications and workplace requirements
	2.7	Existing safe work methods for dealing with unplanned situations are discussed with appropriate person/s and documented
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment and with the approval of an authorised person
	2.9	Ongoing checks of the quality of repair work are undertaken in accordance with workplace procedures
	2.10	Repairs are carried out efficiently without unnecessary waste of materials and energy and damage to apparatus circuits, the surrounding environment or services
3 Complete work and report	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Component fittings are aligned to verify repaired component/s conform to industry standards, job specifications and requirements
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Repairing and maintaining electrical machine components must include at least two of the following:	• shaft • bearing housing • end shield • fan • coupling • machine housing

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG164A Repair and maintain mechanical components of electrical machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0017 Repair and maintain mechanical components of electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation and reports
- inspecting and testing completed mechanical maintenance work
- machining mechanical components in accordance with safe working practices and workplace procedures
- maintaining mechanical components of electrical machines
- planning to repair/maintain mechanical components of electrical machines
- repairing mechanical component/s of electrical machines, including:
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - documenting repairs in accordance with workplace procedures and instructions
  - establishing the scope of the repair work
  - repairing component to relevant industry standards
  - securing work piece/parts/components correctly
  - selecting appropriate repair method
  - sharpening cutting tools/twist drills correctly, as required.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- dangers and safety precautions, including hazardous dust, cleaning material and safe working practices
- current industry practices and technologies
- machining industry practices and technologies

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- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements including relevant safe working practices
- relevant workplace documentation
- relevant workplace policies, procedures and instructions
- repairing mechanical components of electrical machines, including:
  - hazards and safety precautions
  - safe working practices
  - electrical machine bearings requirements, including:
    - bearing damage and remedial action
    - handling and storage of bearings
    - lubrication and calculation of bearing life
    - types, clearances, and techniques for removing and fitting bearings
  - machines couplings, including:
    - fitting and aligning couplings
    - fitting and aligning pulleys
    - types of belts and their applications
    - types of couplings and applications
  - machine components of electrical machines
  - machine faults, inspection and testing procedures
  - dismantling/assembling and repairing workplace procedures/instructions, including marking of electrical connections, recording positions of gears/pulleys/couplings, dismantle procedures, bearing removal/replacement and test run
  - brushes, including characteristics, types, selection and components
  - mechanical components removal and installation, including:
    - marking of winding connections
    - motor alignment
    - alignment workplace procedures/instructions
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources should reflect current industry practices in relation to repairing mechanical components of electrical machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0018 Select wiring systems and select cables for low voltage electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select wiring systems and cables for electrical installations operating at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordinating between protective devices and conductors, and documenting selection decisions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c..

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

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UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan wiring systems for general electrical installations	**1.1** Scope and nature of the electrical installation is determined from job specifications
	1.2 WHS/OHS requirements and workplace procedures and other regulatory requirements are identified and applied
	1.3 Cable routes, the route lengths of cable, and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate person/s
2 Select wiring systems and cables for general electrical installations	**2.1** Wiring system is selected and suitable for the environments in which it will operate

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	2.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards
	2.3	Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity in accordance with relevant industry standards
	2.4	Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards
3 Document electrical installation	**3.1**	Manufacturer data is referenced in selection of equipment to ensure materials comply with safety requirements and relevant industry standards
	3.2	Rationale for wiring system selections and calculations are documented in accordance with workplace procedures
	3.3	Electrical installation arrangement and specifications for all selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting wiring systems and cables for at least two general electrical installations, including:	• a main switchboard, supplying more than one circuit each for:
	  • lighting
	  • socket outlets
	  • fixed appliances
	• one installation must include a circuit supplying a three-phase load

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- one installation must include a safety service or alternate supply
- one installation must include a distribution board separate from the main switchboard

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG107A Select wiring systems and select cables for low voltage electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0018 Select wiring systems and select cables for low voltage electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- calculating the expected voltage drop in a given circuit
- calculating the expected fault-loop impedance for a given circuit arrangement
- selecting cables to satisfy voltage-drop requirements in addition to current-carrying capacity requirements
- selecting cables to satisfy fault-loop impedance requirements in addition to current-carrying capacity requirements and voltage drop requirements
- selecting conductor size based on the maximum current requirement for a given installation condition
- determining the extent and nature of the installation for job specifications
- determining cable routes, the route lengths of cables and the conditions in which the wiring system is to operate
- determining the number and types of circuits required for a particular installation
- determining current requirements for given final sub-circuits
- determining layout/schedule of circuits for given installations
- selecting wiring system suitable for the installation environment
- selecting wiring systems, including voltage-drop, fault-loop impedance and minimum conductor size to satisfy current-carrying capacity
- selecting compliant earthing system components
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel, equipment
- determining maximum demand for consumer mains, sub-mains and final sub-circuits for an installation in accordance with industry and regulatory standards
- documenting electrical installation design
- identifying and applying installation requirements for switchboards in accordance with industry and regulatory requirements

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- identifying layout/schedule of circuits for low voltage (LV) electrical installation
- arranging installation loads onto separate circuits
- identifying performance requirements for an electrical installation to comply with safety and regulatory requirements
- selecting cables for consumer mains, sub-mains and final sub-circuits to meet maximum demand and installation conditions, including any derating factors
- determining suitability of the cable insulation
- selecting circuit protection devices to satisfy maximum demand and coordination in accordance with industry and regulatory requirements
- selecting circuit protection devices to satisfy requirements for coordination, discrimination, fault protection and overcurrent
- selecting control and isolation devices to satisfy AS/NZS 3000 requirements for a range of loads and environmental conditions
- selecting isolation and control devices as required by the designed installation and in accordance with industry and regulatory requirements
- applying the requirements of the relevant industry standards, including AS/NZS 3000, to all work tasks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- design and safety performance requirements, including:
  - harmful effects against which the electrical installation design must provide protection
  - electrical installation performance standards
  - supply characteristic considerations when designing an electrical installation
  - methods to determine maximum demand in consumer mains, sub-mains and final subcircuits
  - reason for dividing electrical installations into circuits and the factors that determine their number and type
  - external factors that may damage an electrical installation
  - methods for protecting persons and livestock against direct and indirect contact with conductive parts and the typical application of each
  - methods to protect against risk of ignition of flammable materials and injury by burns from the thermal effects of current in normal service
  - likely sources of unwanted voltages and the methods for dealing with this potential hazard
  - methods for protecting persons and livestock against injury and property against damage from the effects of overcurrent
  - requirements for protection against fault current
  - requirements for protection against the harmful effects of faults between live parts of circuits supplied at different voltages
  - need for protection against injury from mechanical movement and how this may be

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achieved
    - features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to electrical installation
- final sub-circuit arrangements including:
    - considerations when determining the number and type of circuits for an installation
    - daily and seasonal demand for lighting, power, heating and other loads in an installation
    - number and types of circuits required for a particular installation
    - current requirements for given final sub-circuits
    - layout/schedule of circuits for given installations
- factors effecting the suitability of wiring systems, including:
    - wiring systems used for particular construction methods and environments
    - installation conditions that may affect the current-carrying capacity of cables
    - external influences that may affect the current-carrying capacity and/or may cause damage to the wiring system
    - AS/NZS 3000 requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed. Note: Wiring systems include cable enclosures, underground wiring, aerial wiring, catenary support, emergency systems, busbar trunking and earth sheath return
- maximum demand on consumer mains/sub-mains, including:
    - methods for determining the maximum demand on an installation's consumer mains and sub-mains
    - maximum demand for the consumer mains for given installations up to 400 ampere (A) per phase
    - maximum demand for given sub-mains
- cable selection based on current-carrying capacity requirements, including:
    - installation conditions for a range of wiring systems and applications
    - external influences that require the use of a derating factor
    - suitability of the cable insulation
    - AS/NZS 3000 requirements for coordination of cables and protection devices
    - AS/NZS 3008 Electrical installations - Selection of cables, used to select conductor size based on the maximum current requirement for a given installation condition, including any applicable derating factors
- cable selection based on voltage-drop requirements including:
    - AS/NZS 3000 requirements for maximum voltage-drop in an installation
    - relevant tables in AS/NZS 3008 Electrical installations - Selection of cables, for unit values of voltage-drop
- cable selection based on fault-loop impedance requirements, including:
    - AS/NZS 3000 requirements for maximum fault-loop impedance in an installation
    - relevant tables in AS/NZS 3008 Electrical installations - Selection of cables, to determine cable impedances
- selecting protection devices, including:

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  - acceptable methods of protection against indirect contact
  - AS/NZS 3000 requirements for selecting methods and devices to protect against indirect contact for a range of installation types and conditions
  - coordination between conductors and protection devices to ensure the protection of cables from overheating due to overcurrent
  - possible injuries to persons and livestock from hazards due to a short circuit
  - AS/NZS 3000 requirements for selecting devices to protect against overload current for a range of circuits and loads
  - AS/NZS 3000 requirements for selecting devices to protect against short circuit current for a range of installation conditions
- selecting devices for isolation and switching, including:
  - requirements for the provision of the isolation of every circuit in an electrical installation
  - need for protection against mechanical movement of electrically activated equipment
  - AS/NZS 3000 requirements for selecting devices for isolation and switching for a range of installations and conditions
- Switchboards, including:
  - AS/NZS 3000 and local supply authority requirements for switchboards
  - tariff structures for the supply of electricity
  - equipment installed at the main switchboards with capacities up to 400 A per phase
  - layout of a main switchboard for an installation supplied with:
    - single phase single tariff whole current metering
    - single phase multiple tariff whole current metering
    - multi-phase single tariff whole current metering
    - multi-phase multiple tariff whole current metering
  - layout of a main switchboard for a multiple tenancy installation with whole current metering
  - layout of a main switchboard, including metering, for an installation supplied with three phase current transformer metering
  - local supply authority requirements for connection of an electrical installation to electrical supply system
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current unrestricted electricians licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0019 Solve problems in direct current (d.c.) machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine correct operation of direct current (d.c.) machines and provide solutions as they apply to electrical installations and equipment.

It includes working safely, the use of testing and measuring devices, and providing solutions derived from measurements and calculations to predictable problems in d.c. machines.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work with d.c. machines	**1.1** Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work
	1.2 WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
	1.5 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
2 Solve d.c. machine problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures
	2.3 Relevant circuits, machines and/or plant are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Operating parameters of a machine are determined from nameplate details
	2.5 Electrical measurements are completed and readings compared with nameplate ratings
	2.6 Methodical techniques are used to identify and resolve problems from measured and calculated values as they

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		apply to machines
	2.7	Machine is connected and tested to determine correct operation
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.9	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
3 Complete work and documentation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in d.c. machines must include at least two of the following:	• shunt generator • series generator • compound generator • permanent magnet d.c. motor • separately excited d.c. motor • shunt d.c. motor • series d.c. motor

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- compound motor
- printed circuit motor
- brushless motor
- stepped motor

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0019 Solve problems in direct current (d.c.) machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- complying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying safety risks associated with using generators, motors. rotating machinery and inductive loads
  - confirming isolation of circuits
- connecting and testing a direct current (d.c.) machine
- identifying of faults in a machine from electrical measurements
- recording electrical measurements and comparing with nameplate ratings
- reversing the direction of rotation of a d.c motor
- ensuring all work complies with relevant industry standards and legislation
- completing required documentation and reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- rotating machine construction, testing and maintenance, including:
  - care, maintenance and testing processes for rotating machines
  - components of a d.c. machine
  - difference between a generator and a motor in terms of energy conversion
  - nameplate of a machine
  - safety risks associated with using rotating machinery
  - types of faults in electric machines
- generators, including:
  - basic operation of a d.c. generator
  - equivalent circuit for a d.c. generator

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  - importance of residual magnetism for a self-excited generator
  - load characteristics of a d.c. generator
  - methods of excitation used for d.c. generators
  - open circuit characteristics of d.c. generators
  - prime movers, energy sources and energy flow used to generate electricity
  - reversing the polarity of a d.c. generator
  - types of d.c. generators and their applications
  - calculating generated and terminal voltage of a d.c. shunt generator
  - applying Fleming's left-hand rule for motors and right-hand rule for generators
- motors, including:
  - basic operation of a motor
  - circuit diagrams and characteristics of the different types of d.c. motors
  - effect of back emf in d.c. motors
  - equivalent circuit for the types of d.c. motors
  - operation of a motor and its energy flow
  - safety risks associated with using motors (including risks of series d.c. motors)
  - torque as the product of the force on the conductors and the radius of the armature/rotor
  - calculating force and torque developed by a motor
  - types of d.c. motors and their applications
- machine efficiency, including:
  - efficiency characteristic of a d.c. machine and the conditions for maximum efficiency
  - losses that occur in a d.c. machine
  - methods used to determine the losses in a d.c. machine
  - calculating losses and efficiency of a d.c machine
  - methods used to maintain high efficiency
- safety considerations for inductive loads
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational

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situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0020 Solve problems in low voltage a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to ascertain correct operation of single and three phase alternating current (a.c.) circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions.

It includes safe working practices, multi-phase circuit arrangements, issues related to fault protection, power factor and multiple earthed neutral (MEN) systems and solutions to circuit problems derived from calculated and measured parameters.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify low voltage (LV) a.c. circuit problem	**1.1** WHS/OHS requirements and workplace procedures for work area are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures and workplace procedures are implemented
	1.3 Safety hazards which have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
	1.4 Circuit problems are identified from documentation or work supervisor to determine the scope of work
	1.5 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.6 Sources of materials required for work are identified in accordance with workplace procedures
	1.7 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
2 Solve LV a.c. circuit problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to single and three phase LV circuits in

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		accordance with workplace procedures
	2.5	Existing circuits are altered to comply with power factor correction in compliance with industry standards
	2.6	Power factor of a circuit is calculated from given measurements
	2.7	Low power factor is improved by altering the reactive power of a circuit
	2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.9	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve circuit problems is documented in accordance with workplace procedures
	3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in a.c. circuits must include:	• determining the operating parameters of existing circuits • altering an existing circuit to comply with specified operating

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	parameters • developing circuits to comply with a specified function and operating parameters of voltage, current, impedance, power and power factor • determining the cause of low power factor in an existing circuit • determining conditions causing an existing circuit to be unsafe, including electric shock hazard from indirect contract with conductive parts
Solving problems in single phase circuits must include:	• connecting single phase circuits • choosing correct instruments • taking measurements correctly and accurately
Solving problems in three phase circuits must include:	• connecting three phase circuits • choosing correct instruments • taking measurements correctly and accurately
Solving problems in LV a.c. circuits must include at least four of the following applications:	• series a.c. circuits • parallel a.c. circuits • series/parallel a.c. circuits • single phase motors/controls • three phase motors/controls • synchronous machines • transformers/auxiliary components • star connected circuits • delta connected circuits • star-delta interconnected circuits • open delta circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG102A Solve problems in low voltage a.c. circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0020 Solve problems in low voltage a.c. circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements Including:
  - implementing OHS/WHS workplace procedures and practices, including risk control measures
  - safely measuring the parameters for the whole or any part of a circuit
- measuring:
  - instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform
  - the phase angle between two or more alternating quantities from a given sinusoidal waveform diagram
  - the fault-loop impedance of typical circuits
  - the branch currents and voltages in a series and parallel resistance inductance capacitance (RLC) circuit and use a phasor diagram to determine the total current and phase angle between circuit voltage and circuit current
- determining:
  - phase relationship between two or more sinusoidal waveforms from a given diagram
  - the impedance, current and voltages and phase angles for a series and parallel resistance capacitance (RC), resistance inductance (RL), and RLC circuit given the resistance, capacitance, inductance and supply voltage
  - comparison of current limiting characteristics of inductors and resistors
  - the relationship between inductive reactance and capacitive reactance and frequency
  - difference between true power, apparent power and reactive power and the units in which these quantities are measured
  - the root-mean-square (rms) value of line and phase, voltage and current given any one of these quantities
  - the effects of a high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where multiple earthed neutral (MEN) earthing is employed
  - the value of neutral current in an unbalanced three phase four wire systems given line

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currents and power factors
  - how the power factor of a three phase installation can be improved
  - fault loop impedance using resistance and reactance values from relevant industry standards
  - voltage, current and resistance from measured or given values of any two of these qualities
  - the phase sequence of a three phase supply
- drawing and labelling the following:
  - the power triangle to show the relationships between true power, apparent power and reactive power
  - the typical combinations of three phase interconnected systems using star and delta connection
  - the impedance triangle for a series RC, RL and RLC circuit
  - the equivalent circuit of a practical inductor
  - phasor diagrams to show:
    - the relationship between two or more alternating current (a.c.) values of voltage and/or current, including 'in-phase', 'out-of-phase', 'phase angle', lead' and 'lag'
    - a series and parallel RC, RL, and RLC circuits
- calculating:
  - rms value of voltage generated in each phase given the maximum value
  - terms in relation to a sinusoidal waveform from values of root-mean-square (rms) value, frequency, peak voltage, period and instantaneous value
  - capacitive reactance and inductive reactance for a given capacitor and inductor
  - total impedance for a series and parallel RLC circuit
- connecting a three-phase star and delta load
- setting up and connecting a single-source resistive a.c. circuit and taking voltage and current measurements to determine the resistance
- applying sustainable energy principles and practices
- completing workplace documentation
- voltage, current and reactance of inductive and capacitive reactance by applying Ohm's law in purely inductive and capacitive a.c. circuits given any two quantities
- altering an existing circuit to comply with specified operating parameters
- developing circuits to comply with a specified function and operating parameters
- determining conditions causing an existing circuit to be unsafe
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- a.c. quantities, including:

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- Pythagoras theorem to a right-angle triangle
- sine, cosine and tangent ratios of a right-angle triangle
- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic field and resulting current
- terms in relation to a sinusoidal waveform involving:
  - period
  - maximum value
  - peak-to-peak value
  - instantaneous value
  - average value
  - rms value
- use of a cathode-ray oscilloscope (CRO) to measure d.c. and a.c. voltage levels

- phasor diagrams, including:
  - convention for representing voltage, current and the reference quantity in a phasor diagram
  - purpose of phasor diagrams
- single element a.c. circuits, including:
  - applications of capacitive, inductive and resistive a.c circuits
  - defining inductive and capacitive reactance
  - relationship between voltage drops and current in resistive a.c. circuit
  - arrangement, characteristics of single item inductive and capacitive circuits
- RC and RL series a.c. circuits, including:
  - capacitive and inductive components in power circuits and systems and the effect on the phase relationship between voltage and current
  - impedance and impedance triangle
  - voltage triangle
  - arrangement, characteristics, and relationship between resistance, capacitance and inductance in RL, RC, and LC series circuits
- RLC series and parallel a.c. circuits, including:
  - practical examples of RLC series and parallel circuits
  - voltage and current triangle
  - relationship between resistance, capacitance and inductance in RLC parallel circuits
- power in an a.c. circuit, including:
  - definition of power factor and phase angle
  - methods used to measure single phase power, energy and demand
  - effects of low power factor
- power factor improvement, including:
  - requirements for power factor improvement
  - methods used to improve low power factor of an installation
  - local supply authority and AS/NZS 3000 requirements regarding the power factor of an

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installation and power factor improvement equipment
    - local supply authority and AS/NZS 3000 requirements for installation of capacitors including safety considerations
    - using manufacturer catalogues to select power factor equipment for a particular installation
- harmonics and resonance effect in a.c. systems, including:
    - conditions in a series and parallel a.c. circuit that produce resonance
    - dangers of series and parallel resonance circuits
    - methods and test equipment used to test for harmonics
    - methods used to reduce harmonics in a.c. power system
    - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome
    - sources in a.c. systems that produce harmonics
    - term harmonic in relation to the sinusoidal waveform of an a.c. power system
- three phase systems, including:
    - features of a multi-phase system
    - comparison of voltages generated by single and multi-phase alternators
    - how three phase is generated in a single alternator
    - advantages of three phase for power systems
    - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
    - method of determining the phase sequence or phase rotation of a three-phase supply
- three phase star connections, including:
    - arrangement and characteristics of a three phase star connection
    - effect of a reversed phase winding of a star connected alternator
    - examples of balanced and unbalanced loads in typical power systems
    - terms balanced load and unbalanced load
- three phase four wire systems, including:
    - purpose of the neutral conductor in three phase four wire systems
    - AS/NZS 3000 requirements regarding neutral conductors
    - AS/NZS 3008.1.1 Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions method for determining voltage drop in unbalanced three phase circuits
- three phase delta connections and interconnected systems, including:
    - arrangement and characteristics of a three phase delta connection
    - effect of a reversed phase winding of a delta connected transformer
    - examples of loads in typical power systems
    - limitations and uses of open delta connections
- energy and power requirements of ac systems, including:
    - purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads

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  - difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system
  - methods used to measure three phase power, energy, power factor and demand
  - using manufacturers catalogues to select measurement equipment for a particular installation
- fault-loop impedance, including:
  - procedures for testing fault-loop impedance
  - term fault-loop impedance of an a.c. power system
- local requirements and relevant industry standards relating to:
  - the installation of capacitors
  - the power factor of an installation and power factor improvement equipment
  - harmonics and resonance effect in a.c. power systems
  - neutral conductors
- phase relationship between line and phase voltages and line and phase currents of star, delta, and typical interconnected systems using star connections and delta connections
- relevant manufacturers' specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0021 Solve problems in magnetic and electromagnetic devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine correct operation of electromagnetic devices and related circuits and provide solutions as they apply to electrical installations and equipment.

It includes working safely; applying power circuit problem-solving processes, including the use of testing and measuring devices; and providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work with electromagnetic devices and circuits	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work
	1.3 Hazards are identified, risks are assessed and control measures are implemented
	1.4 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
	1.5 Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements
	1.6 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
2 Solve electromagnetic device and/or circuit problems	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures
	2.3 Relevant circuits and devices are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Operating parameters of an existing circuit with an electromagnetic device are determined

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	2.5	Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to electromagnetic devices/circuits
	2.6	Existing circuit with an electromagnetic device is altered to comply with specified operating parameters
	2.7	Circuit with electromagnetic device is developed to comply with a specified function and operating parameters
	2.8	Electrical equipment is connected and tested to determine correct operation
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and documentation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Electromagnetic devices must include at least three of the following devices:	• reed switches • solenoids • relays • contactors • inductive limit switches • lifting magnets • core balance devices • magnetic overloads • magnetic brakes • magnetic circuit breakers

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0021 Solve problems in magnetic and electromagnetic devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards and assessing risks and applying control measures
  - confirming isolation of circuits
- using methodological techniques to solve problems in circuits with an electromagnetic device from measured and calculated values
- determining the operating parameters of an existing circuit with an electromagnetic device, including:
  - the direction of magnetic field around a current-carrying conductor and a coil
  - a current-carrying conductor under the influence of a magnetic field
- modifying an existing circuit with an electromagnetic device to comply with specified operating parameters
- connecting electromagnetic devices to comply with a specified function and operating parameters
- completing work and documenting activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- magnetism, including:
  - common magnetic and non-magnetic materials
  - magnetic field patterns of magnets
  - magnets attraction and repulsion when brought in contact with each other
  - practical applications of magnets
  - principle of magnetic screening (shielding) and its applications

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- electromagnetism, including:
  - conventions representing direction of current flow in a conductor
  - direction of force between adjacent current-carrying conductors
  - effect of current, length and distance apart on the force between conductors
  - magnetic field around an electromagnet, a single conductor and two adjacent conductors carrying current
  - magnetomotive force (mmf) and its relationship to the number of turns in a coil and the current flowing in the coil
  - practical applications of electromagnets
- magnetic circuit types and associated terminology
- methods used to reduce electrical losses in a magnetic circuit
- electromagnetic induction, including:
  - principle of electromagnetic induction
  - applications of electromagnetic induction
  - Lenz's law
- inductance, including:
  - applications of the different types of inductors
  - industry standard symbols for inductors
  - types of inductor cores
  - construction of an inductor
  - definition of terms: self-induction, inductance and mutual inductance, and time constants
  - effect of physical parameters on the inductance of an inductor
  - relationship between load voltage, current and self-induced electromagnetic force in a direct current (d.c.) circuit having inductance
  - practical applications for the effects of self and mutual induction
  - undesirable effects of self and mutual induction
- magnetic principles in measurement instruments
- magnetic devices, including:
  - operation and application of:
    - magnetic sensing devices
    - contactors and relays
    - solenoids
  - magnetic methods used to extinguish the arc between opening contacts
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities

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Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0022 Supply effective and efficient lighting products for domestic and small commercial applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to respond to customer requests for the supply of effective and efficient luminaries and associated control and mounting apparatus for domestic and commercial applications.

It includes engaging and clarifying customer requirements for domestic and commercial lighting products and supplying the most appropriate and compliant fittings.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0016 Provide advice on effective and energy efficient lighting products

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Engage with customer	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Communication with customers is conducted in a

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		professional and courteous manner in accordance with workplace procedures
	1.3	Customer enquiries are responded to promptly and politely and in accordance with workplace policies and procedures
	1.4	Appropriate interpersonal and communication skills are used to facilitate accurate and relevant exchange of information with customers
2 Clarify customer request	**2.1**	Appropriate questioning and active listening are used to determine customer needs
	2.2	Customer requests are interrogated to clearly ascertain the most suitable lighting products
	2.3	Customers are advised of technical and compliance specifications that need to be considered when choosing lighting products
	2.4	Customers are provided with product information, available lighting options and assisted to identify preferred option/s
	2.5	Product information to address customer lighting needs are identified and, as required, assistance sought from appropriate person/s
3 Supply lighting product	**3.1**	Lighting produces are supply as agreed with customer in accordance with workplace policy and procedures
	3.2	Own work is monitored and adjusted in accordance with requirements for job quality, customer service and efficient resource use

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Engaging with customers to supply domestic lighting products must include at least one of the following:	• a new three-bedroom domestic dwelling • an addition/renovation of an indoor/outdoor entertainment and garden area to an existing domestic dwelling
Engaging with customers to supply commercial lighting products must include at least one of the following:	• a commercial building of less than 200 m2, half on which will be used as a small appliance service area • a café or restaurant having a kitchen, restroom and dining area • a small medical centre having a doctor's surgery, preparation room, waiting room, service desk and bathroom and kitchen facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG182A Supply effective and efficient lighting products for domestic and small commercial applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0022 Supply effective and efficient lighting products for domestic and small commercial applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- clarifying customer requests
- engaging with customer
- engaging with customers to supply appropriate lighting products for domestic and small commercial applications, including:
  - advising customers of technical and compliance aspects that need to be considered when choosing lighting products
  - ascertaining the most suitable lighting products
  - communicating with customers in a professional manner and responding promptly to enquiries
  - dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - providing customers with information about available options and assisted to identify their preferred option
  - supplying lighting produces as agreed with the customer and in accordance with workplace policy and procedures
- using effective communication skills/language, including:
  - active listening
  - asking for clarification/feedback
  - questioning
  - seeking advice from supervisor/appropriate person/s.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- current industry standards, practices and technologies
- interpersonal and communication skills, including listening, questioning and receiving feedback
- lighting applications for domestic and small commercial premises, including:
  - criteria for recommending the most appropriate light fittings (luminaires)
  - dealing with customer requests
  - lamp types, where colour is important for functional or safety reasons
  - lighting and energy conservation practices and technologies
  - luminaire types, where glare or illumination level gradients may cause difficulty for vision or introduce safety problems
  - manufacturer information, catalogues and other technical information/specifications
  - relevant regulatory requirements, including;
    - Building Code of Australia (BCA) requirements for lighting energy input/metre2 for domestic dwellings
    - state/territory-based energy sustainability requirements (e.g. BASIX in NSW)
    - compliance requirements and marking (as per AS/NZS 4417 Regulatory compliance mark for electrical and electronic equipment) of products
    - electrical installation work to be carried out/supervised by a licensed electrician under a licensed electrical contractor
- relevant job safety assessments or risk mitigation processes, including safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used should reflect current industry practices in relation to supplying effective and efficient lighting products for domestic and small commercial applications
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to terminate cables, cords and their conductors at accessories and current-using devices, designed to operate at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes working safely to industry standards, wiring systems, cable types and applications; selecting appropriate termination accessories; preparing and terminating cables and cords; terminating cables/cord conductors; and ensuring completed termination complies with industry standard requirements.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to terminate cables, cords and conductors	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks assessed and risk control measures and workplace procedures implemented in accordance with workplace procedures
	1.3 Safety hazards that have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
	1.4 Junction box/terminal enclosures and terminal types are inspected to determine the type and size of cable and conductor termination devices needed
	1.5 Tools, materials and testing devices needed for terminating cables and cords are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Terminate cables, cords and conductors	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked as isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3 Cable/cord ends are cut and sheath/insulation stripped with sufficient length to prevent strain on terminations and without undue waste

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	2.4	Cable glands/retaining devices are fitted and secured to ensure cable/cord cannot be pulled out of entry into junction box/terminal enclosure
	2.5	Conductors are prepared to suit the terminal type they are to be connected to
	2.6	Conductors are terminated to ensure continuity across the terminal
	2.7	Methodology for dealing with unplanned situations are discussed with appropriate person/s and documented
	2.8	Unplanned situations are responded to safely in accordance with workplace procedures, in a manner that minimises risk to personnel, equipment and with the approval of an authorised person
3 Test terminated cables and cords	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Terminated cables are tested to ensure continuity and insulation resistance comply with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Terminating cables, cords and accessories must include at least five of the following types of cables each at a junction box and a device terminal enclosure:	• circular thermoplastic sheathed (TPS) • flat TPS • flexible cables • flexible cords • fire protection cables • steel wire armoured (SWA) cables • thermoplastic insulated (TPI) cables
Terminating conductors must include the	• screw terminal

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following terminal types:

- stud terminal
- tunnel terminal

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG106A Terminate cables, cords and accessories for low voltage circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- confirming relevant circuits are isolated dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- terminating wiring and accessories for low voltage circuits, including:
  - cutting cable ends and stripping sheath/insulation to a sufficient length
  - fitting and securing cable glands/retaining devices correctly
  - preparing and terminating conductors to suit the type of terminal at which they are to be connected
  - selecting appropriate cable/cord and conductor devices
  - testing completed cables to ensure compliant continuity and insulation resistance
- inspecting junction box/terminal enclosures and determining the type and size of required cable and conductor termination devices
- testing terminated cables and cords.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- cable types and terminations, including:
  - application of various cords and cables types, as defined by the properties of their insulation, sheathing, armouring and/or screening
  - Australian and international colour standards for cords and cables
  - single cables, flexible cables, flexible cords, screened cables, armoured cables, other similar and like cables
  - construction of common cables

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    - identification of cords and cables by conductor size, type and rating
    - identification of hardware used in terminating cords and cables
    - requirements to protect and support cables adequately (protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable)
    - structural components of cables and their purpose (conductor material, stranding, insulation type, voltage rating, screening, sheathing, armour and serving)
    - techniques for termination of cords and cables using crimp lugs, tunnel connectors, soldering and solderless lugs
- cords, cables and plugs, including:
    - techniques for selection of flexible cords for given applications
    - preparation of cord ends for connection
    - fitting standard three pin plug tops and extension sockets to flexible cords
    - connecting a variety of plug tops and extension sockets to different flexible cord types
- flat thermoplastic sheathed (TPS) wiring systems, including techniques for:
    - installation of flat TPS cable in trunking and duct for the supply of socket outlets
    - using flat TPS cable for lighting looms
- circular TPS wiring systems, including techniques for:
    - installation of circular TPS cables on cable ladder/tray
    - installation of circular TPS cable
- thermoplastic insulated (TPI) cables in non-metallic enclosures, including techniques for:
    - cutting and setting rigid non-metallic ducting, trunking and conduit and accessories
    - installation of circuits using TPI cables in non-metallic enclosures
- TPI cables in metallic enclosures, including techniques for:
    - fitting metallic conduit to metallic trunking and accessories
    - cutting, threading and setting metallic conduit
    - installation of circuits using TPI cables in metallic conduit, ducting and trunking
- fire protection cabling and systems encompassing:
    - requirements when passing a wiring system through a fire rated wall or floor
    - techniques for recognising different fire protection cable types
    - techniques for installation and termination of fire protection cable
- steel wire armoured (SWA) cables, including techniques for:
    - identifying accessories used with SWA cables
    - installation of circuits using SWA cables
- trailing cables and catenary systems, including techniques for:
    - identifying equipment used with trailing cable and catenary systems
    - installation of catenary wiring systems
    - installation of trailing cable systems supplying pendant sockets
- relevant industry standards and testing requirements for safe operation relating to:
    - cords, cables and plugs

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  - circular and flat TPS wiring systems
  - TPI cables in non-metallic enclosures
  - TPI cables
  - fire protection cabling
  - SWA cables
  - trailing cables and catenary systems
- relevant manufacturer specifications

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current unrestricted electricians licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0024 Test and connect alternating current (a.c.) rotating machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to test and connect alternating current (a.c.) rotating machines. It includes safe working practices, ascertaining correct operation of a.c. machines and solving problems as they apply to servicing, fault finding, installation and compliance work functions

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

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UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to test and connect a.c. rotating machines	**1.1** Nature of machine/s problem is obtained from relevant documentation or work supervisor to determine scope of work
	1.2 WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.3 Hazards are identified, risks are assessed, and control measures are implemented
	1.4 Materials required for work are determined in accordance with workplace procedures
	1.5 Tools, equipment and testing devices required for work are obtained and confirmed fit for purpose and serviceable in accordance with workplace procedures
2 Test and connect a.c. rotating machines	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures and workplace procedures
	2.3 Relevant circuits, machines and/or plant are checked as being isolated, as required in accordance with WHS/OHS requirements and workplace procedures

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	2.4	Problem-solving techniques are used to resolve problems from measured and calculated values as they apply to a.c. rotating machines
	2.5	Machine is verified as electrically safe and connected to electrical supply and commisioned in accordance with workplace procedures and industry standards
	2.6	Unplanned situations are dealt with safely and with the approval of an authorised person/s
	2.7	Problems dealt with safely and without damage to machines, the surrounding environment or services using sustainable energy practices
3 Complete work and document activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to solve problems is documented in accordance with workplace procedures
	3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Testing and connecting a.c. rotating machines must include at least three of the following types of motor (must include at least one single phase and one three phase):	• capacitor start capacitor run motors • capacitor start motors • permanent magnet motor • permanently split capacitor motor • portable generator • shaded pole motor

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- split phase motors
- standby generator
- three phase squirrel-cage motor
- three phase synchronous generator
- three phase synchronous motor
- three phase wound rotor motor
- universal motor

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0024 Test and connect alternating current (a.c.) rotating machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures, including:
  - identifying and assessing hazards and risks, and implementing control measures
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- applying problem-solving techniques in alternating current (a.c.) rotating machines, including:
  - connecting three phase induction motor in both star and delta connections
  - connecting, running and reversing the direction of a single phase motor
  - connecting, running and reversing the direction of a three phase motor
  - determining the operating parameters of existing machines
  - altering an existing machine connection or circuit to comply with specified operating parameters
  - developing machines/circuits to comply with a specified function and operating parameters
  - determining the cause of low efficiency in an existing machine
  - performing insulation resistance, continuity and winding identification tests
  - identifying faults/faulty components in single and three phase motors
  - testing insulation resistance of a three phase induction motor prior to connection to the supply
  - testing winding resistance (ohmic value and continuity) of a three phase induction motor prior to connection to the supply
- applying sustainable energy principles and practices
- completing problem-solving activities documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating principles of three phase induction motors, including:
  - speed of rotation of a rotating magnetic field
  - relationship between the rotor speed, slip and rotor frequency
  - basic principle of operation of an induction motor
  - motor action in a generator and generator action in a motor
- three phase induction motor construction, including:
  - basic component parts of a three phase induction motor
  - types of rotors (standard and wound) used in three phase induction motors
  - connections for three phase induction motor in both star and delta
- three phase induction motor characteristics, including:
  - relationship between torque, speed, and power and interpretation of speed/torque curves of induction motors
  - squirrel cage motors operating characteristics conditions necessary for an induction motor to produce maximum torque
  - operating characteristics of an induction motor from nameplate information and by measurement
  - induction motors efficiency and minimum energy performance standards (MEPS)
  - full load efficiency and power factor of induction motors
- split phase - single phase motors, including:
  - identification of split phase induction motors
  - principles of operation of a split phase induction motor
  - construction and basic characteristics of a split phase induction motor
  - applications of split phase induction motors
- single phase motors – capacitor and shaded pole types, including identification of single phase induction motors, including:
  - capacitor start
  - capacitor start/capacitor run, permanent split capacitor (PSC) and shaded pole
  - principles of operation of each motor type listed above
  - operating characteristics and typical applications of each motor type listed above
  - reversing the direction of rotation of each of the motors listed above
- single phase motors – series universal, including:
  - principles of operation of a series universal motor
  - identification and functions of each of the basic parts of a series universal motor
  - operating characteristics and typical uses for a series universal motor
- motor protection, including:
  - reasons why motor protection is required
  - requirements of the AS/NZS 3000 with regards to motor protection
  - types of motor overload protection

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  - operating principles of thermal cut-out devices, thermal and magnetic motor protection devices for single and three phase motors
  - electrical features of motor protection high rupturing capacity (HRC) fuses
  - effects of undervoltage and overvoltage on motors and motor circuits
  - effects of repetitive starting and/or reversing on motors
  - special requirements for motor protection in high humidity or moist environments, high temperature areas and corrosive atmospheres
  - operating principles of phase failure protection
  - selecting suitable protective devices for a given motor and starter combination
- three phase synchronous machines- operation principles and construction, including:
  - power transfer diagram of an a.c. synchronous machine
  - generation of a sinusoidal waveform
  - operation of a synchronous alternator
  - operation of a synchronous motor
  - principles of operation of an asynchronous generator (induction generator)
  - identification of main parts of a synchronous alternator/motor
  - methods used to provide the excitation of a synchronous alternator/motor
  - block diagram of an alternator voltage regulator
  - advantages gained by the parallel operation of alternators
  - starting methods of synchronous motors
- alternators and generators, including:
  - effects on the generated voltage of variations in excitation
  - effects on generated voltage of variations in load current and power factor
  - identification of characteristic curves of an alternator
  - types of prime movers used with single and three phase portable/standby alternators
  - manual operation of single and three phase portable/standby alternators
  - ratings of single and three phase portable/standby alternators
  - applications of single and three phase portable/standby alternators
  - construction details of single and three phase portable/standby alternators
  - common faults found in portable/standby alternators
  - parallel connection
  - load sharing
  - standby generators and associated arrangements
- safe testing methods for locating faults in low voltage (LV) a.c machines, including:
  - insulation resistance
  - coil resistance
  - centrifugal switch
  - capacitor
  - bearing wear
  - locked rotor

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  - load
  - thermal overload
  - machine controls
- mechanical faults and associated symptoms that occur in LV a.c rotating machines, including:
  - bearings
  - fans
  - bent shaft
  - locked rotor
  - blocked air vents
  - centrifugal switches
  - environmental factors
- faults on driven loads and couplings and their consequences, including:
  - slipping belts
  - poorly aligned coupling (shims)
  - vibration
  - loads bearing failing
  - load stalling
- electrical faults and associated symptoms that occur in LV a.c rotating machines, including:
  - open and partially open circuit winding
  - short and partially short circuit winding
  - open circuit rotor
  - burnt out winding
  - coil shorted to frame
- relevant manufacturer specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational

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conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0025 Test and connect transformers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in transformers. It includes safe working practices, ascertaining correct operation of transformers and solving problems as they apply to servicing, fault finding, installation and compliance work functions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to test and connect transformers	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risk are assessed and control measures and workplace procedures are implemented
	1.3 Safety hazards which have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
	1.4 Nature of transformer problem is obtained from documentation, service manual or work supervisor to determine scope of work
	1.5 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.6 Materials required for work are determined in accordance with workplace procedures
	1.7 Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Solve problems in transformers	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures

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	2.3 Relevant circuits, machines and/or plant are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Problem-solving methods are used to resolve problems from measured and calculated values as they apply to transformers
	2.5 Transformer is verified as electrically safe and connected to electrical supply and commisioned in accordance with workplace procedures and industry standards
	2.7 Problems are resolved without damage to circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document activities	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2 Worksite is cleaned and made safe in accordance with workplace procedures
	3.3 Justification for solutions used to solve machine problems is documented in accordance with workplace procedures
	3.4 Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training package Companion Volume Implementation Guide.

Testing and connecting transformers must be demonstrated in relation to solving problems in any three of the following transformers:	• power transformers • current transformers • voltage transformers

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- auto-transformers
- isolation transformers
- welding transformers
- step-up and step-down transformers

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0025 Test and connect transformers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
  - identifying and assessing hazards and risks, and implementing control measures
  - applying safe working procedures when connecting and testing transformers
  - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- solving problems with transformers, including:
  - determining the operating parameters of an existing transformer
  - altering an existing transformer circuit to comply with specified operating parameters
  - developing transformer circuits to comply with a specified function and operating parameters
  - determining the cause of low efficiency in an existing transformer
  - determining conditions causing an existing circuit to be unsafe
- determine polarity markings for an unidentified single phase double wound transformer
- determining the value of a transformers secondary voltage and current from nameplate data when solving problems in transformer operations
- determining voltage and current in the windings of an auto-transformer by calculation
- selecting transformers for specific application
- testing servicability of transformers
- applying sustainable energy principles and practices
- completing problem-solving activities documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- AS/NZS 3000 Electrical installations requirements and restrictions on the installation and use

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of transformers
- methods used to insulate low voltage (LV) and high voltage (HV) transformers
- types of information stated on transformer nameplates
- types of lamination style and core construction used in transformers
- relevant industry standards relating to transformers
- application of transformers
- transmission and distribution transformers
- construction of voltage transformers
- ratings of voltage transformers
- auto-transformers and instrument transformers, including:
  - advantages and disadvantages of an auto-transformer
  - risks and safety control measures associated with connection and disconnection of instrument transformers
  - connection diagrams for instrument transformers
  - applications for auto-transformers and instrument transformers
  - construction of current transformers
  - ratings of current transformers
- transformer operation, including:
  - principles of mutual induction of a transformer
  - factors that determine the induced voltage in a transformer winding
  - determining the value of a transformers secondary voltage and current given one winding's electrical details and turns ratio
  - identification of voltage and current components of a phasor diagram for a transformer on no-load
  - principles of power transferred from the primary to secondary when a load is connected using a phasor diagram neglecting impedance drops
  - safety features specified in relevant industry standards with respect to transformers and isolating transformers
  - determining circuit operating characteristics when solving problems in LV transformers
- transformer losses, efficiency and cooling, including:
  - methods used for natural and forced cooling of transformers
  - power losses which occur in a transformer
  - tests which allow the power losses of a transformer to be determined
  - relationship between transformer cooling and rating
- transformer voltage regulation including:
  - reasons for voltage variation in the output of a transformer
  - voltage regulation as applicable to a transformer
- percentage impedance, including:
  - as applied to transformers
  - techniques for determining percentage impedance of a transformer by relevant calculation
- parallel operation of transformers, including:

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- need for parallel operation of transformers
- techniques for connecting in parallel to supply a single load (loading on transformers operating in parallel)
- conditions/restrictions required before two transformers can be connected in parallel
- the consequences/effect of an incorrect connection

- relevant manufacturer specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current Unrestricted Electricians Licence issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licencing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions. In addition, evidence of Performance Evidence requirements of this unit must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0026 Align and install traction lift equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to align and install traction lift mechanical and electrical equipment.

It includes planning, aligning and installing lift mechanical and electrical equipment by working safely in alignment of lift structures such as measuring, marking out and aligning of lift installations, including machine room equipment, lift well equipment, the lift car and associated equipment and landing door frames and doors. It also includes setting out of multiple lift wells in varying configurations and the installations of well and pit equipment, lift car equipment, superstructure and counterweights, machine room equipment, landing, door frames and door, landing buttons and indicator boxes; and completing workplace reporting activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0045 Diagnose and rectify faults in traction lift systems

UEEEL0019 Solve problems in direct current (d.c.) machines

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UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install lift equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of work to be undertaken is identified from site plans, drawings, specifications and/or discussions with appropriate person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others

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	1.5	Tools, equipment and alignment devices needed to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Align and install lift equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Equipment is installed straight and square in the required locations and within acceptable tolerances
	2.5	Equipment is aligned and installed in accordance with manufacturer specifications and regulatory requirements
	2.6	Existing safe work methods for dealing with unplanned situations are discussed with appropriate person/s and documented in accordance with workplace procedures
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Checks of the quality of installed equipment are undertaken in accordance with workplace procedures
	2.9	Equipment installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices
3 Complete and report alignment and installation activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to ensure that the installed equipment conforms to job specifications and workplace requirements

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3.4	'As-installed' equipment is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Aligning and installing must include at least the following:	• two of the following alignments:
	  • lift car alignment
	  • lift well alignment
	  • machine room alignment
	• two of the following types of equipment:
	  • lift cars
	  • lift well equipment
	  • machine room equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG167A Align and install traction lift equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0026 Align and install traction lift equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- aligning and installing traction lift equipment
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- carrying out alignment functions
- completing and reporting alignment and installation work activities
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- planning to align and install traction lift equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- alignment equipment, including rail gauges, straight edges, shims/packers and lasers
- car operating devices, including slowdown switch, limits, inductors, door locks, vanes and shaft information
- current industry practices, workplace procedures and technologies
- equipment layout, including specifications, clearances, 3-D impact on layout and lift code
- fixing devices and methods, including inserts and expansion and chemically bonded anchors
- installation and alignment of hydraulic equipment, including ram/cylinder, hydraulic lines and bleeding hydraulic system
- lift car alignment, including superstructure, frames and doors
- lift well alignment, including guides and brackets, trimmer beams, buffers, compensators, landing doors and locks
- lift well/s, including lift well alignment

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- multiple lift wells, including:
  - corrective action and setting of well templates
  - plumb charts analysis for 3-D impact
  - use of theodolite, centre line/datum, survey information and layouts
- single lift wells, including:
  - purpose and need for accuracy, including identification of clearances
  - modification of errors, including adjustment and use of template
  - use of plumb lines and weights
  - measuring and marking out lift wells and machine room, where appropriate
  - plumbing chart and use of laser level
- machine room alignment, including machine and fixings, diverter, governor and tensioning sheaves, counterweight centre lines and roping system
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and relevant industry standards, including:
  - traction lift mechanical equipment
  - traction lift electrical equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions
- running clearances requirements, including safety gear, car sill and door operator
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to aligning and installing lift equipment
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0027 Carry out low voltage electrical field testing and report findings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to carry out low voltage (LV) electrical field testing and report findings.

It includes preparing, inspecting and testing of electrical field systems, documenting and reporting test results.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Verify compliance and functionality of low voltage general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

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UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to carry out electrical field inspection and testing	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of work to be undertaken is determined from reports and/or discussions with appropriate person/s

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	1.4	Advice is sought from the work supervisor to ensure work activity is coordinated effectively with others
	1.5	Tools, equipment and testing devices required to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Carry out electrical field inspection and testing	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to inspect, test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are isolated in accordance WHS/OHS requirements and workplace procedures
	2.4	Safety hazards from fault/s and/or breakdown are documented and risk control measures implemented in consultation with appropriate person/s
	2.5	Field testing and measuring techniques of electrical systems, circuits, and apparatus are conducted in accordance with workplace procedures
	2.6	Circuit/apparatus/components are dismantled as required to facilitate testing and parts stored for protection against loss or damage
	2.7	Tests are determined from report and appropriate testing/measuring instruments selected in accordance with manufacturer instructions and relevant industry standards
	2.8	Unplanned events are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.9	Testing activities are carried out without damage to apparatus, circuits, environment or services using sustainable energy practices
3 Complete electrical field testing and report findings	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Apparatus is reassembled after testing as required and work area is cleaned and made safe in accordance with workplace procedures

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3.3 Test findings and recommendation for actions are reported in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out and reporting findings of electrical field tests must include the following:

- locating faults
- examining operating parameters
- accessing compliance with regulations
- evaluating quality compliance

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG132A Carry out low voltage electrical field testing and report findings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0027 Carry out low voltage electrical field testing and report findings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- carrying out inspection and testing, including:
  - selecting and setting up relevant testing/measuring instruments
  - using relevant testing techniques
  - using testing and measuring instruments
- completing electrical field inspection, testing and report findings
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- following workplace procedures and instructions
- preparing electrical field testing, including:
  - identifying work from reports and/or discussion with appropriate person/s
  - locating tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- advanced electrical testing and measuring devices, including:
  - testing/measuring devices and their application
  - circuit arrangement and safety procedures for connection of testing/measuring devices into a circuit
  - taking readings
  - storage, maintenance and care of testing/measuring devices

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- measurement concepts, including:
  - notion of error, accuracy and resolution
  - sources of measurement error and uncertainties
  - instrument specifications and calibration certificates
  - test and measuring instrument safety certification levels and their application
- types of field measuring instruments and their application, including:
  - instrument meter movements and readouts, including moving coil, moving iron and dynamometer meter movements, liquid crystal display (LCD) digital and screen readouts
  - role of a microprocessor/controller in measuring instrument
- measuring low voltages (LV) and direct currents (d.c.) and alternating currents (a.c.), including:
  - LV and current measurement techniques embodied in microprocessor-based instruments
  - causes of inaccuracies and overcoming them
  - test instrument set-up and safety procedures
  - interpreting test readings
- measuring high voltages (HV) and d.c. and a.c. including:
  - HV and current measurement techniques embodied in microprocessor-based instruments
  - causes of inaccuracies and overcoming them
  - test instrument set up and safety procedures
  - interpreting test readings
- measuring fault levels and (earth) fault-loop impedance, including:
  - fault and fault-loop impedance measurement techniques embodied in microprocessor-based instruments
  - causes of inaccuracies and overcoming them
  - test instrument set-up and safety procedures
  - interpreting test readings
- measuring power, energy, reactive power, power factor and maximum demand, including:
  - power measurement techniques embodied in microprocessor-based instruments
  - causes of inaccuracies and overcoming them
  - test instrument set-up and safety procedures
  - interpreting test readings
- measuring power quality, including:
  - power measurement techniques embodied in microprocessor-based instruments
  - causes of inaccuracies and overcoming them
  - test instrument set-up and safety procedures
  - interpreting test readings, including power quality measurement, including waveform distortion, harmonics, power factor and transients
- power cable faults and fault detection techniques, including:
  - poor connection (high resistance)
  - open circuit

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    - insulation breakdown and arcing
    - Varley and Murray loop tests
    - pulse test
    - echo test
    - radio-based tests
- application and limitations of the various cable fault detection techniques, including:
    - cable fault detection techniques embodied in microprocessor-based instruments
    - causes of inaccuracies and overcoming them
    - test instrument set-up and safety procedures
    - interpreting test readings
- problem-solving techniques
- relevant industry standards and codes of practice for electrical inspection and testing
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant quality workplace procedures
- relevant sustainable energy practices
- relevant tools, equipment, resources and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct compliance and functional verification of electrical apparatus and existing circuits.

It includes inspection and testing to verify electrical apparatus and/or existing circuits are safe and comply with all requirements. It covers working safely; visual inspections and mandatory, optional and functional testing following verification procedures; identifying non-compliance defects and mandatory reporting requirements.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Current Licence Holders:

Those holding an ‘Electrical Fitter Occupational Licence’ or equivalent issued in an Australian state or territory and are currently employed as an Electrical Fitter meet the requirements of this unit and its prerequisite requirements.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

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UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0005 Develop and connect electrical control circuits

UEEEL0047 Identify, shut down and restart systems with alternate supplies

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multipath circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test electrical apparatus and circuits	**1.1** WHS/OHS measures for the site are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 WHS/OHS hazards not previously identified are noted and risk control measures implemented

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	1.4	Electrical apparatus, existing circuits documentation and relevant industry standards are reviewed and applied
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7	Preparatory work is checked to ensure no damage has occurred and complies with requirements
2 Inspect and conduct safety testing	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Need to inspect, test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked as being isolated in accordance with WHS/OHS requirements and switch-off, lock out and tagging procedures
	2.4	Electrical apparatus/circuits are inspected to determine if they are compliant with industry standards, function safely and as intended
	2.5	Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating
	2.6	Protection methods and devices are validated as meeting coordination requirements for overload and short circuit protection
	2.7	Switchgear and control gear are validated as being appropriately rated and meeting functional requirements
	2.8	Evidence that electrical equipment complies with safety requirements is cited
	2.9	Earthing system components are checked that they are correctly located and conductors correctly sized
	2.10	Mandatory tests are conducted on all connected electrical apparatus and existing circuits in accordance with industry standards

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	2.11	Testing is conducted to verify that fault-loop impedance is sufficiently low and residual current devices operates as intended
3 Report inspection and test findings	**3.1**	WHS/OHS risk control work completion measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Non-compliance defects are identified and reported in accordance with workplace procedures
	3.4	Recommendations for rectifying defects are made in accordance with workplace procedures
	3.5	Mandatory documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verification and testing must include at least the following two different types of installations:	• electrical apparatus and existing circuits comprising an apparatus and existing circuit supplied by a single phase supply • electrical apparatus and existing circuits supplied by a three phase supply

Unit Mapping Information

This unit replaces and is not equivalent to UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- selecting correct tools and testing equipment
- confirming correct isolation in accordance with workplace procedures, industry and regulatory standards
- completing visual inspection and testing of electrical apparatus and circuits, including:
  - identifying visual non-compliance defects
  - using effective methods for conducting mandatory and optional tests
  - using testing devices
- reporting inspection and recommendations, including:
  - identifying non-compliance and functional defects from test results
  - identifying causes of non-compliance and functional defects
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical safety, including:
  - safety procedures for working on electrical systems, circuits and apparatus
  - safe working practices as a normal part of carrying out electrical installation work
  - isolation and lockout procedures
  - tools and equipment needed to conduct electrical work compliance inspection and testing
- legislated regulations, including:

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  - legislation and regulations that require electrical apparatus and existing circuits to be inspected and tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring electrical apparatus and existing circuits are safe
  - results of tests that show an electrical apparatus and existing circuits is safe for connection to the supply
  - results of periodic inspection and tests that show electrical equipment are safe to use
- visual inspection of electrical apparatus and existing circuits for compliance with relevant industry standards, including:
  - protection requirements
  - general condition
  - wiring systems
  - equipment and accessories
  - earthing
- testing electrical apparatus and existing circuits, including:
  - tests to ensure insulation resistance is adequate; earth continuity is such that it will ensure the operation of protection devices under earth fault conditions; polarity of active/s and neutral for final sub-circuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; residual current device (RCD) use for correct operation and sensitivity
  - functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device
  - tests that show all circuits and devices operate as intended
  - tests to determine the fault level at a particular point in an installation
- documentation, including:
  - results of tests conducted on an electrical apparatus and existing circuits comply with requirements and ensure the installation is safe
  - documents of the results of testing electrical apparatus and existing circuits as required by the local supply authority
  - documents of periodic testing and inspection of electrical equipment, including tagging requirements
- effects of electric current, including:
  - physiological effects of current
  - basic principles by which an electric current can produce heat, light, motion and a chemical reaction
- single path practical circuit, including:
  - arrangement of energy source, protection device, switch and load in a circuit
  - the purpose of each component in the circuit
  - consequences of an open circuits, closed circuits and short circuits
- multiple path direct current (d.c.) circuits, including:
  - circuit configurations and connection
  - relationship between parameter of voltage, current, resistance power dissipation in the

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whole or any part of the circuit
    - safely measuring the parameters for the whole or any part of the circuit
    - methods of determining circuit behaviour for variation in any of the parameters from measured and calculated values
- alternating voltage and current generation, phase relationships, energy in an alternating current (a.c.) circuit, including:
    - sinusoidal voltage generation and resulting current
    - the terms period, maximum value, peak-to-peak value, instantaneous value, average value, root-mean-square (r.m.s.) value and frequency
    - three phase generation
    - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
    - method of determining the phase sequence or phase rotation of a three phase supply
    - methods of determining power and energy supplied by three phase circuits
- fundamental safety principles of relevant industry standards, including:
    - definition of terms
    - fundamental safety principles of protection against direct and indirect contact with live parts; thermal effects; overcurrent; earth faults; abnormal voltages; spread of fire; mechanical injury and external influences
    - fundamental principles of installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs) and verification of compliance
- electric motor selection, starting method and overload protection, including:
    - types of motor enclosures suitable for given environmental conditions
    - criteria for selecting motor starters and overload protection
    - types and connection arrangements for direct-on-line and reduced voltage starters
    - thermal, magnetic and thermistor overload protection methods
- protective and functional earthing, including:
    - relevant industry standards requirements
    - purpose of protective and functional earthing
    - parts of the protective earthing systems
    - earthing arrangements, earthing of equipment and equipotential bonding
    - methods of determining the maximum fault-loop impedance for a circuit
    - selection of protective conductor and active conductor sizes for each circuit to ensure earth fault-loop impedance is sufficiently low to operate the circuit protective device
- multiple earth neutral (MEN) system and its application, including:
    - the roles of the protective earthing (PE) and neutral (N) conductors in a consumer's installation and their relationship to the protective earth neutral (PEN) conductor in the electricity distributor system or sub-main to an outbuilding
    - the importance of the MEN link when a fault occurs
    - the likely consequences of the absence of the MEN link or high impendence in the PEN conductor when a fault occurs

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  - the requirements for installation of a MEN link in an installation and an outbuilding
- application of transformers, including:
  - transformers used in distribution and transmission systems and large consumer installations
  - transformers used in welding machines
  - applications in appliances
  - risks and safety control measures associated with connection and disconnection of instrument transformers
  - safe working procedures when connecting and testing transformers
  - relevant industry standards requirements and restriction on the installation and use of transformers
- protection of circuit against overcurrent and abnormal voltages, including:
  - relevant industry standards requirements
  - minimum fault levels specified by electricity distributors
  - methods and arrangement for protection against short-circuit currents and overload currents
  - coordination of overload and short circuit protection devices
  - coordination between conductors and overload protection device
  - causes of over and undervoltage
  - device and requirements for protection against over and undervoltage
- use of RCDs and extra-low voltage (ELV) for fault protection, including:
  - limitation of an RCD to protect against contact with live parts
  - relevant industry standards requirements for use of RCDs
  - conditions for use of ELV to provide for basic and fault protection
  - relevant industry standards requirements for installation of separated extra-low voltage (SELV) and protected extra-low voltage (PELV) systems
- control and protection of electrical apparatus and existing circuits, including:
  - relevant industry standards requirements
  - devices for functions of isolation, emergency, mechanical maintenance and functional control
  - method for assessing prospective short circuit current
  - devices and arrangement for protection against overload and short circuit current
  - additional protection by RCD
  - protection against switchboard internal arc faults
- electrical apparatus and existing circuits in hazardous areas, including:
  - relevant industry standards requirements
  - types of areas classified as a hazardous area
  - standards to which the maintenance of electrical equipment shall comply
  - addition training required to work competently with electrical equipment for hazardous areas
- verification of compliance of electrical apparatus and existing circuits, including:

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  - relevant industry standards requirements
  - visual inspection to determine if electrical apparatus and existing circuits complies with requirements of relevant industry standards and relevant specific installation standards
  - mandatory tests in AS/NZS 3017 Electrical installations - Verification guidelines
  - portable tool safety testing and tagging system in accordance with AS/NZS 3760 In-service safety inspection and testing of electrical equipment
- ability to perform effective safe isolation of any equipment, including:
  - preparation of a safe work method statement (SWMS) or job safety analysis (JSA) for effective safe isolation
  - safe methods for identifying source of supply to be isolated
  - switching-off, lock-out and tagging procedures
  - safe methods for confirming effective and safe isolation
- relevant industry standards requirements to carryout repairs and terminating thermoplastic insulated cables, elastomer sheathed cables, cross-linked polyethylene (XLPE) sheathed cables, high temperature cables, armoured cables and neutral screened cables in a wide range of applications
- circuit tests required for electrical cables in a range of installations and final sub-circuit, including:
  - following safe testing procedures
  - tests to show if the earth continuity and earth fault-loop impedance are sufficiently low
  - testing to show if insulation resistance is sufficiently high
  - testing to show if the polarity and circuit connections are correct
- techniques to read, sketch and interpret electrical diagrams including:
  - purpose and characteristics of schematic, block and wiring diagrams, plans and schedules
  - conventions used in documenting electrical information
  - read and interpret schematic, block and wiring diagrams, plans and schedules
  - sketch electrical diagrams using conventional symbols
- WHS/OHS, including:
  - WHS/OHS regulations
  - legal responsibilities for employers and employees
  - employer's and employee's own duty of care
  - safety committees and their role
- requirements for personal safety in the workplace including:
  - purpose and use of SWMS or JSA
  - purpose and process of reporting WHS/OHS incidents
  - safety procedures for working with electrical circuits and equipment
  - procedures for safe and effective isolation of electrical supply
  - regulations for the supervision of apprentices and trainees
- process to rescue a person in contact with live electrical conductors or equipment and the primary importance of the safety of the rescuer
- application of emergency first aid requirements for an electric shock victim, including:

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  - calling for help
  - applying cardiopulmonary resuscitation (CPR)
  - selection and use of fire extinguishers to control electrical fire at accident site
- dangers of high voltage (HV) equipment and distribution systems, including:
  - step and touch and induced voltages
  - sources of induced voltage and stored energy
  - creepage and clearance requirements
  - application of safe working procedures in the vicinity of HV equipment
- systematic method of commissioning and decommissioning electrical equipment and existing circuits, including:
  - commissioning safety procedures
  - circuit voltage testing
  - phase rotation checks
  - functional testing
  - instrument and control parameter settings
  - decommissioning safety procedures
  - identification of circuits with their control and protection devices
  - impact of isolation on other parts of an installation
  - tagging, testing and earthing
  - safe removal of equipment
- diagnosing and rectifying faults in electrical apparatus and existing circuits, including:
  - faults such as open circuit, short circuit, incorrect connections, insulation failure, unsafe condition, apparatus/component failure and related mechanical failure
  - apparatus such as control devices, fixed appliances/accessories, lighting, electrical machines motors and controls, socket outlets, transformers, protection and metering devices
  - circuits such as those supplying fixed appliances, lighting, socket outlets, motors and controls circuits, transformers, electronic or computer-based equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0029 Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct compliance inspection of low voltage (LV) electrical installation with demand exceeding 100 ampere (A) per phase.

It includes preparing and conduction compliance inspection, and actioning and reporting on findings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Verify compliance and functionality of low voltage general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0030 Conduct compliance inspection of single phase LV electrical installations

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UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct compliance inspection	**1.1** WHS/OHS procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 WHS/OHS hazards not previously identified are noted and risk control measures are implemented in consultation with appropriate person/s

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	1.4	Installation documentation and relevant industry standards are reviewed and applied
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Tools, equipment and testing devices to verify compliance are obtained and checked for operation and safety in accordance with workplace procedures
2 Conduct compliance inspection	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Inspection of the mains and main switchboard is conducted of protection metering earthing circuit arrangements and markings in accordance with relevant industry standards
	2.5	Inspection of circuits is conducted for compliance of the installed wiring accessories switchgear/control gear and current-using devices in accordance with relevant industry standards
	2.6	Electrical equipment compliance with relevant safety requirements and industry standards is obtained from appropriate person/s
	2.7	Inspection is conducted to verify compliance of earthing insulation polarity circuit connections and operation of residual current devices (RCDs) in accordance with relevant industry standards
	2.8	Fault-loop impedance is determined as being sufficiently low by testing calculation and compliance with arrangement of the installation in accordance with relevant industry standards
	2.9	Unplanned events are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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3	**Act and report on inspection findings**	**3.1** WHS/OHS work completion risk control measures and procedures are followed
		3.2 Non-compliance defects are identified and documented in accordance with relevant industry standards and workplace procedures
		3.3 Actions for non-compliance defects within the scope of inspection responsibilities are in accordance with workplace procedures and relevant industry standards
		3.4 Inspection report is completed and issued to appropriate person/s in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting compliance inspection must include at least two electrical installations comprising of the following:

- consumer mains
- distribution boards related to the control of an individual occupier’s portion of a multiple installation
- earthing system
- final sub-circuits
- main earthing system
- main switchboard
- sub-mains

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG123A Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0029 Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- obtaining appropriate documentation and equipment in preparation for the inspection
- conducting detailed inspections and testing methodically
- identifying non-compliance defects
- relating non-compliance defects with appropriate clause in regulatory standards
- acting within the inspection authority when dealing with non-compliance defects
- documenting and reporting inspection findings
- dealing with unplanned events
- applying scope of inspection responsibilities
- completing inspection
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures
- preparing and conducting compliance inspection, including:
  - inspecting mains, circuits and electrical equipment
- obtaining and using tools, equipment and testing devices
- performing calculations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical installations, inspections and safety compliance audits and tests of installations with demand of over 100 amperes (A) per phase, including:
  - electrical installations, inspections and safety compliance audits encompassing:

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    - inspection types and their scope
    - inspection of general electrical installations, special electrical installations, hazardous areas installations, safety audits and investigations
    - inspection procedures
    - processes for confirming that performance standards have been met
    - actions and procedures for dealing with non-compliance defect
- problem-solving techniques
- processes for inspection of single supply arrangements, main switchboard and earthing
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0030 Conduct compliance inspection of single phase LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct compliance inspection of single phase low voltage (LV) electrical installation.

It includes preparing and conducting compliance inspections, and actioning and reporting on inspection findings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating (a.c.) or 120 V direct current (d.c.)

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Verify compliance and functionality of low voltage general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

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UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct compliance inspection	**1.1** WHS/OHS procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 WHS/OHS hazards not previously identified are noted, risks assessed, and risk control measures implemented in consultation with appropriate person/s

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	1.4	Installation documentation and/or relevant industry standard for the installation is reviewed and applied
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Tools, equipment and testing devices to verify compliance are obtained in accordance with workplace procedures and checked for operation and safety
2 Conduct compliance inspection	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test and measure live electrical work is conducted in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Inspection of the mains and main switchboard is conducted for compliance of protection metering earthing circuit arrangements and markings in accordance with relevant industry standards
	2.5	Inspection of circuits is conducted for compliance of the installed wiring accessories switchgear/control gear and current-using devices in accordance with relevant industry standards
	2.6	Evidence electrical equipment complies with safety requirements is sought from appropriate person/s and sighted
	2.7	Inspection is conducted to verify compliance of earthing insulation polarity circuit connections and operation of residual current devices (RCDs) in accordance with relevant industry standards
	2.8	Fault-loop impedance is determined as being sufficiently low by testing calculation and compliance with arrangement of the installation in accordance with relevant industry standards
	2.9	Unplanned events are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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3 Act and report on inspection findings	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2 Non-compliance defects are identified and documented in accordance with relevant industry standards and workplace established procedures
	3.3 Actions are taken for non-compliance defects within the scope of inspection responsibilities in accordance with workplace procedures and relevant industry standards
	3.4 Inspection report is completed and issued to appropriate person/s in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting compliance inspection must include at least two domestic electrical installations comprising of the following:	• a single phase consumer mains, main earthing system and those parts of a main switchboard related to the control of the installation and protection against spread of fire • two wire supply with a maximum demand not exceeding 100 amperes (A)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG122A Conduct compliance inspection of single phase LV electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0030 Conduct compliance inspection of single phase LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- obtaining appropriate documentation and equipment in preparation for the inspection
- conducting detailed inspections and testing methodically
- identifying non-compliance defects
- relating non-compliance defects with appropriate clause in regulatory standards
- acting within the inspection authority when dealing with non-compliance defects
- documenting and reporting inspection findings
- dealing with unplanned events
- applying scope of inspection responsibilities
- completing inspection
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures
- preparing and conducting compliance inspection, including:
  - inspecting mains, circuits and electrical equipment
- obtaining and using tools, equipment and testing devices
- performing calculations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical installations, single phase inspections, including:
  - enterprise customer relations protocols encompassing:
    - purpose of customer relations
    - procedures for dealing with customers

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    - dealing with customer issues
  - electricity regulatory safety requirements encompassing:
    - regulatory requirements for ensuring the safety and integrity of electrical installations
    - regulatory requirements are relative to the jurisdiction for which competency is sought
    - types and scope of electrical inspections and safety audits
    - authority of electrical inspectors
  - electrical installations, single phase inspections encompassing:
    - scope of inspection of single phase installations
    - processes for inspection of single supply arrangements, main switchboard and earthing
    - actions and procedures for dealing with non-compliance defects
- problem-solving techniques
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0031 Conduct compliance inspection of special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct compliance inspection of special low voltage (LV) electrical installations.

It includes preparing and conducting compliance inspection, and actioning and reporting on inspection findings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Verify compliance and functionality of low voltage general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0069 Select and arrange equipment for special LV electrical installations

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UEEEL0073 Verify compliance and functionality of special LV electrical installations

UEEEL0030 Conduct compliance inspection of single phase LV electrical installations

UEEEL0029 Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct compliance inspection	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in

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		preparation for the work are followed
	1.3	WHS/OHS hazards not previously identified are noted and risk control measures are implemented in consultation with appropriate person/s
	1.4	Installation documentation and/or relevant industry standard for the installation is reviewed and applied
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Tools, equipment and testing devices to verify compliance are obtained in accordance with workplace procedures and checked for operation and safety
2 Conduct compliance inspection	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Need to inspect, test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Inspection of the mains and main switchboard is conducted for compliance of protection metering earthing circuit arrangements and markings in accordance with relevant industry standard
	2.5	Inspection of circuits is conducted for compliance of the installed wiring accessories switchgear/control gear and current-using devices in accordance with relevant industry standard
	2.6	Electrical equipment complies with relevant safety requirements and industry standards and is obtained from appropriate person/s
	2.7	Inspection is conducted to verify compliance of earthing insulation polarity circuit connections and operation of residual current devices (RCDs) in accordance with relevant industry standards
	2.8	Fault-loop impedance is determined as being sufficiently low by testing calculation and compliance with arrangement of the installation in accordance with

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		relevant industry standards
	2.9	Unplanned events are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Act and report on inspection findings	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Non-compliance defects are identified and documented in accordance with relevant industry standards and workplace procedures
	3.3	Actions are taken for non-compliance defects within the scope of inspection responsibilities in accordance with workplace procedures and relevant industry standards
	3.4	Inspection report is completed and issued to appropriate person/s in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting compliance inspection must include at least three types of installations from the following:	• caravan parks • construction and demolition sites • marinas • medical treatment areas • moveable premises
Electrical installations must include at least the following:	• consumer mains • earthing system and distribution boards • final sub-circuits and requirement to the installation type • main earthing system and main switchboard and sub-mains

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG124A Conduct compliance inspection of special LV electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0031 Conduct compliance inspection of special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- obtaining appropriate documentation and equipment in preparation for the inspection
- conducting detailed inspections and testing methodically
- identifying non-compliance defects
- relating non-compliance defects with appropriate clause in regulatory standards
- acting within the inspection authority when dealing with non-compliance defects
- documenting and reporting inspection findings
- dealing with unplanned events
- applying scope of inspection responsibilities
- completing inspection
- applying relevant industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures
- preparing and conducting compliance inspection, including:
  - inspecting mains, circuits, electrical equipment on at least three types of installations from the following:
    - caravan parks
    - construction and demolition sites
    - marinas
    - medical treatment areas
    - moveable premises
- obtaining and using tools, equipment and testing devices
- performing calculations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- compliance inspections of low voltage (LV) special electrical installations, including:
  - technical standards, regulations and codes for special electrical installations encompassing:
    - additional requirements for special installations
    - caravan parks
    - construction and demolition sites
    - marinas
    - medical treatment areas
    - moveable premises
    - high voltage (HV) installation in consumer's premises
- problem-solving techniques
- procedures for dealing with non-compliance defects
- processes for inspection of main switchboard and earthing
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant tool, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0032 Conduct electrical tests on HV electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct electrical tests on high voltage (HV) electrical machines.

It includes preparing and conducting electrical inspections and tests on a three phase induction machine and completing workplace documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0033 Conduct electrical tests on LV electrical machines

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0068 Rewind three phase low voltage induction machines

or

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct electrical tests on a three phase induction machine	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures for work preparation are followed
	1.3 Scope of work is determined from job sheets, specifications and regulatory requirements

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		1.4	Advice is sought from work supervisor to ensure work activity is coordinated effectively with others
		1.5	Materials required for work are obtained in accordance with workplace procedures
		1.6	Tools, equipment and testing devices required for work are obtained and checked for operation and safety
2	**Conduct electrical tests on a three phase induction machine**	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
		2.2	Machines/equipment are isolated in accordance with WHS/OHS requirements and workplace procedures
		2.3	HV electrical inspection and tests are conducted to determine cause of faults and/or operational condition of the machine
		2.4	Status of the machine is determined from inspection and test results and recorded in accordance with workplace procedures
		2.5	Problem-solving techniques are used to resolve unplanned events
		2.6	Quality of work checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape in accordance with workplace procedures and work instructions
		2.7	Work is completed in accordance with given timeframe, environment and workplace procedures
3	**Complete work report**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2	Status of HV electrical machine is documented in accordance with workplace procedures and relevant person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting electrical inspection and tests must include at least the following:	• two different HV electrical machines with one machine containing two winding faults
Purpose of tests must include at least the following:	• causes of faults • the machine has been correctly repaired and complies with all requirements

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG158A Conduct electrical tests on HV electrical machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0032 Conduct electrical tests on HV electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- dismantling machine and storing parts securely
- setting up tests correctly
- taking test readings accurately
- determining the status of the machine correctly from test results
- documenting the status of the machine clearly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- conducting inspection and electrical tests on three phase induction machines, including:
  - following winding specifications
  - preparing stator for winding
  - selecting correct coils
- following quality procedures, workplace procedures and instructions
- using tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- high voltage (HV) motor testing devices and techniques, including:
  - test/measuring devices and their application
  - connection of test/measuring devices into a circuit encompassing:
    - safety procedures
    - circuit arrangement of test/measuring devices
  - taking and interpreting readings
  - storage, maintenance and care of test/measuring devices

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- problem-solving techniques
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant quality workplace procedures
- relevant testing methods
- relevant tools, equipment and materials
- relevant WHS/OHS legislated requirements
- relevant winding data
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0033 Conduct electrical tests on LV electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct electrical safety and functional inspections and tests of electrical machines designed to operate at low voltage (LV).

It includes planning and conducting electrical inspections and tests on induction machines by working safely; setting up and conducting continuity, insulation and short circuit inspections and tests; and interpreting and documenting test results.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

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or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

or

UEEEL0056 Place and connect electrical coils

UEEEL0068 Rewind three phase low voltage induction machines

UEEEL0074 Wind electrical coils

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct electrical inspections and tests on induction machines	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed
	1.3 Scope of work is determined from job specifications and regulatory requirements

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	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5	Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with workplace procedures
	1.6	Materials required for the work are obtained in accordance with workplace procedures
	1.7	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Conduct electrical inspections and tests on induction machines	**2.1**	Existing WHS/OHS risk control work measures are followed
	2.2	Machines/equipment are inspected, checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Electrical inspection and tests are conducted to establish operational condition of the machine in accordance with workplace procedures and instructions
	2.4	Serviceability status of the machine is determined from inspection and test results and recorded
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Electrical testing is completed within timeframe, environment and workplace conditions
3 Complete workplace reports	**3.1**	WHS/OHS work completion risk controls measures are followed
	3.2	Serviceability status of the machine is documented in accordance with workplace procedures and appropriate person/s notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting LV electrical machine inspections and tests must include the following:	• inspection and testing of at least one machine prior to routine maintenance, overhaul or repair • inspection and testing of at least one machine after routine maintenance, overhaul or repair

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG157A Conduct electrical tests on LV electrical machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0033 Conduct electrical tests on LV electrical machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including identifying safety requirements prior to undertaking electrical tests on low voltage (LV) electrical machines
- applying sustainable energy principles and practices
- completing workplace reports
- conducting electrical inspection and tests LV electrical machines, including:
  - conducting testing, including continuity, insulation resistance, short circuit and hi-pot on a magnetic circuit
  - connecting of test/measuring devices into the circuits of LV electrical machines
  - determining the status of the machine correctly from test results
  - documenting machine serviceability status clearly
  - setting up tests correctly
  - taking inspection and test readings accurately
- ensuring circuits are effectively isolated prior to undertaking tests on LV electrical machines
- identifying faults in LV machines from data recorded when testing LV electrical machines
- planning to conduct electrical inspection and tests on LV electrical machines
- taking and interpreting readings from test/measuring devices while undertaking tests on LV electrical machines
- using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- connection of test/measuring devices into a circuit, including safety procedures and circuit arrangement
- current industry practices and technologies

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- electric motor/machine mechanical measuring, inspecting and testing devices and techniques, including:
  - LV motor/machine inspection and testing devices and techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant safe working practices, including safety procedures when using test/measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- storage, maintenance and care of test/measuring devices
- sustainable energy principles and practices
- taking and interpreting readings for continuity, insulation resistance, and short circuit tests on a magnetic circuit
- test/measuring devices and their application, including a multimeter, growler, insulation resistance, continuity and short circuit testers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that current industry practices in relation to conducting electrical inspection and tests on LV electrical machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0034 Conduct mechanical tests on electrical machines and components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct mechanical, safety and functional inspection and testing of electrical machines and their mechanical components.

It includes planning and conducting mechanical inspections and tests on electrical machines and components by working safely, setting up and conducting tests, taking measurements, interpreting and documenting test results, and completing workplace documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0033 Conduct electrical tests on LV electrical machines

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

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and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0068 Rewind three phase low voltage induction machines

or

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct mechanical tests on electrical machines and components	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed

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	1.3	Scope of work is determined from job sheets, specifications and regulatory requirements
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5	Machine data is obtained from data records or directly from measurements and recorded in accordance with workplace procedures
	1.6	Materials required for the work are obtained in accordance with workplace procedures
	1.7	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Conduct mechanical tests on electrical machines and components	**2.1**	Existing WHS/OHS risk control work measures are followed
	2.2	Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Mechanical tests/measurements are conducted to establish operational condition of the machine
	2.4	Serviceability status of the machine is determined from test results and recorded
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Electrical coil work is completed within timeframe, environment and workplace conditions
3 Complete workplace report	**3.1**	WHS/OHS work completion risk controls measures are followed
	3.2	Serviceability status of the machine, including specifications for any repair work required, is documented in accordance with workplace procedures and appropriate person/s notified

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting mechanical inspections and tests must include the following:	• at least one machine prior to routine maintenance, overhaul or repair • at least one machine after routine maintenance, overhaul or repair

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG159A Conduct mechanical tests on electrical machines and components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0034 Conduct mechanical tests on electrical machines and components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace reports
- conducting mechanical inspections and tests on electrical machines and components, including:
  - determining the serviceability status of the machine correctly from inspection and test results
  - dismantling machine and storing parts securely
  - documenting the serviceability status of the machine clearly
  - setting up tests correctly
  - taking test and measurement readings accurately
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- planning to conduct mechanical inspection and tests on electrical machines and components
- using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- current industry practices and technologies
- electric motor mechanical measuring, inspection and testing devices and techniques
- devices and techniques for measuring geometric attributes, including a measuring device for geometric attributes, dynamic balancing and alignment of shafts
- operational inspection, test/measuring devices and their application
- set-up of test/measuring devices, including safety and set-up procedures

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- storage, maintenance and care of test/measuring devices, including mechanical measuring and testing devices
- taking and interpreting readings, including taking and interpreting reading by the correct method, measuring roundness, dynamic balancing and aligning shafts
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that current industry practices in relation to conducting mechanical inspections and tests on electrical machines and components
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0035 Design effective and efficient lighting for public, open and sports areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design effective and efficient lighting for public, open and sports areas.

It includes designing lighting for public, open areas, and indoor and outdoor sporting facilities and/or urban parks. It also includes adhering to compliance standards, energy management, lighting control and available lighting products appropriate to the design; and documenting completed design for approval

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0063 Provide photometric data for illumination system design

UEEEL0070 Select effective and efficient light sources and luminaries for given locations and designs

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design lighting for public, open	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a

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	and sports areas		given work area are identified, obtained and applied
		1.2	Scope of the lighting requirement is identified from design brief
		1.3	Safety and relevant conditions to the lighting design are identified, obtained and applied in accordance with relevant industry standards
		1.4	Design development work is planned in consultation with relevant person/s involved in accordance with scheduled timelines
2	**Develop lighting design**	**2.1**	Relevant performance standards, compliance methods and lighting equipment is applied to lighting design in accordance with relevant industry standards
		2.2	Alternative lighting designs are reviewed in accordance with the design brief
		2.3	Safety, functionality, maintenance and budgetary considerations are incorporated in lighting design
		2.4	Lighting design draft is checked in accordance with design brief and relevant industry standards
		2.5	Lighting design is documented for submission to relevant person/s for acceptance and approval
		2.6	Unplanned situations are dealt with in accordance with workplace procedure
3	**Obtain approval for lighting design**	**3.1**	Lighting design is documented and presented to client representative and/or relevant person/s
		3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final design is documented and approval obtained from relevant person/s
		3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing lighting for public and open areas must include at least two of the following:

- flood lighting of tennis courts
- flood lighting of netball or basketball courts
- flood lighting of football grounds
- lighting of squash courts
- lighting of indoor or outdoor bowling greens
- swimming pool lighting
- sporting spectator lighting
- other sporting applications
- stair lighting/passageway lighting
- park lighting
- mall lighting
- car park lighting

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG187A Design effective and efficient lighting for public, open and sports areas.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0035 Design effective and efficient lighting for public, open and sports areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent and nature of the lighting requirements from a design brief
- identifying and understanding safety and other requirements to which the lighting design shall comply
- planning to meet scheduled timelines
- applying appropriate knowledge of lighting performance compliance and lighting equipment in designing the lighting
- considering alternative arrangements for the lighting design, including safety, functional, maintenance and budgetary factors in the lighting design
- documenting and presenting the lighting design
- responding appropriately to requests to alter the design
- documenting and obtaining approval of the lighting design
- dealing appropriately with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- developing lighting design
- identifying and applying safety and relevant conditions in accordance with relevant industry standards
- monitoring quality of work
- preparing to design lighting for public, open and sports areas.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- open area and sports lighting design for outdoor and sports application lighting, including:
  - reasons for quality lighting in sport
  - key terms in open area and sports lighting encompassing:

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    - quantity of light required
    - horizontal luminance
    - vertical illuminance
    - illuminance uniformity
    - uniformity gradient
    - modelling and shadows
    - colour rendering
    - colour temperature
    - glare
    - emergency escape lighting
    - switching mode
    - emergency (continuity) TV lighting
    - obtrusive light
  - the sports lighting design process encompassing:
    - project definition
    - lighting study
    - questions for indoor and outdoor venues
    - lamp selection
    - luminaire selection
    - arrangement of luminaires
    - cost of ownership
    - installation
    - aiming, measuring and commissioning
    - maintenance
  - layout for lighting in multi-purpose halls and enclosed areas
  - sports grounds and stadiums:
    - lighting configuration
    - sports grounds with no spectator stand
    - sports grounds and stadiums with a spectator stand
  - swimming/diving areas
  - other considerations:
    - theatrical lighting effects and dynamic lighting
  - recommendations:
    - recommendations for non-televised events
    - classes of play
    - recommendations for televised events
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing effective and efficient lighting for public, open and sports areas
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0036 Design effective and efficient lighting for residential and commercial buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design effective and efficient lighting for residential and commercial buildings.

It includes preparing and developing lighting design for residential and commercial buildings, and obtaining approval of the design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0063 Provide photometric data for illumination system design

UEEEL0070 Select effective and efficient light sources and luminaries for given locations and designs.

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design lighting	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for a given work area are identified, obtained and applied

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		1.2	Scope, extent and nature of the lighting work requirements are determined from design brief
		1.3	Safety and regulatory requirements for the lighting design are identified, obtained and applied in accordance with relevant industry standards
		1.4	Work is planned to meet scheduled timelines in consultation with others involved in the lighting installation or associated work
2	**Develop lighting design**	**2.1**	Lighting performance and equipment design is applied in accordance with relevant industry standards
		2.2	Alternative lighting design/s is considered based on the requirements outlined in the design brief
		2.3	Safety, functional and budgetary considerations are incorporated in the lighting design
		2.4	Lighting design draft is checked in accordance with relevant industry standards and design brief requirements
		2.5	Lighting design is documented for submission to appropriate person/s for acceptance and approval
		2.6	Solutions to unplanned events are identified in accordance with workplace procedures
3	**Obtain approval for lighting design**	**3.1**	Lighting design is presented and explained to client representative and/or relevant person/s
		3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final lighting design is documented and approval obtained from appropriate person/s in accordance with workplace procedures
		3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Lighting design must be demonstrated in at least three of the following:	• large residential lighting design • indoor area shop lighting • stairway or stairwell lighting • flood lighting • amenities lighting • lighting for specific commercial processes and tasks • lighting for ambient and aesthetic effect • display lighting • security lighting

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG186A Design effective and efficient lighting for residential and commercial buildings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0036 Design effective and efficient lighting for residential and commercial buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent and nature of the lighting requirements from a design brief
- identifying and understanding safety and other requirements to which the lighting design shall comply
- planning to meet scheduled timelines
- applying appropriate knowledge of lighting performance compliance and lighting equipment in designing the lighting
- considering alternative arrangements for the lighting design
- documenting and presenting the lighting design
- responding appropriately to requests to alter the design
- documenting and obtaining approval of the lighting design
- dealing appropriately with unplanned events
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- following quality and workplace procedures
- developing lighting design, including:
  - using lighting equipment
- updating work documents.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- lighting design, including:
  - lighting principles
  - lighting applications

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  - safety aspects of lighting
  - energy efficiency
  - integrating various lighting types into one application
  - control and energy management
  - interpreting and applying manufacturers' technical data
  - architectural considerations
  - utilising natural lighting
  - use of computer programs for lighting design
  - safety, functional, maintenance and budgetary factors in the lighting design
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- relevant quality workplace procedures
- relevant job safety assessments or risk mitigation processes
- relevant sustainable energy practices
- relevant tools, equipment, resources and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0037 Design electrical installations with a low voltage demand greater than 400 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design electrical installations with a low voltage (LV) demand greater than 400 ampere (A) per phase.

It includes preparing and developing designing schemes for the protection of persons and property, correct functioning, compatibility with the supply and arrangement of circuits. It also includes determination of fault levels, effective switchgear, control gear, and protection against over-current and over and under-voltage and wiring based on calculations to meet required safety and performance standards and functional requirements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0057 Plan electrical installations with a low voltage demand up to 400 A per phase

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

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and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design electrical installations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the electrical installation is identified from design brief
	1.3 Electrical installation safety and regulatory requirements are identified, obtained and applied
	1.4 Design development work is planned in consultation with relevant person/s involved with the work to meet scheduled timelines
2 Develop installation design	**2.1** Relevant electrical installation performance standards, compliance methods and electrical equipment is applied to installation design in accordance with relevant industry standards
	2.2 Alternative installation design/s is developed in accordance with the design brief
	2.3 Safety, functional and budgetary considerations are

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		incorporated in installation design
	2.4	Installation design draft is checked in accordance with design brief and relevant industry standards
	2.5	Installation design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with in accordance with workplace procedures
3 Obtain approval for installation design	**3.1**	Installation design is documented and presented to client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing electrical installations with a LV demand in excess of 400 A per phase switchboard design installation must include at least the following:

- main switchboard
- multiple tenancies
- distribution boards
- single and three phase final sub-circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG127A Design electrical installations with a low voltage demand greater than 400 A per phase.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0037 Design electrical installations with a low voltage demand greater than 400 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying performance standards, compliance methods and lighting equipment to installation design
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- consulting with relevant person/s in planning design work
- identifying the scope of the installation design brief
- monitoring quality of work
- planning to meet scheduled timelines
- preparing to design electrical installations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- low voltage (LV) electrical installations with a demand greater than 400 ampere (A) per phase and advanced methods of cable and protection selection, including:
  - electrical installations, determination of demand encompassing:
    - acceptable methods for determining demand in mains and sub-mains
    - applying calculation and assessment methods of determining demand in mains and sub-mains

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- electrical installations, over-current protection encompassing:
  - application of acceptable methods for determining prospective fault current
  - relationship between prospective fault current and characteristics of protective devices
  - relationship between over-current protections at various points in an electrical distribution system
- electrical installations, over-voltage and under-voltage protection encompassing:
  - application of acceptable methods for determining the need for over-voltage and under-voltage protection
  - methods and devices providing over-voltage and under-voltage protection
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing electrical installations with a LV demand greater than 400 A per phase.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0038 Design switchboards rated for high fault levels (greater than 400 A)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design switchboards rated for high fault levels (greater than 400 ampere (A)).

It includes preparing and developing switchboard design and obtaining approval for switchboard design. It also includes designing schemes for protection of persons and property; correct functioning and compatibility with the supply; and arrangement of circuits. It also includes determination of fault levels, effective switchgear, control gear, and protection against over-current, over and under-voltage, and wiring based on calculations to meet required safety and performance standards and functional requirements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0059 Plan low voltage switchboard and control panel layouts

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

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UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEEEL0062 Provide engineering solutions to problems in complex polyphase power circuits

UEECD0036 Provide engineering solutions for problems in complex multiple path circuit

UEECD0039 Provide solutions to basic engineering computational problems

and

UEECD0041 Solve electrotechnical engineering problems

or

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design	**1.1** Work health and safety (WHS)/occupational health and

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	switchboards		safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
		1.2	Scope of the switchboard is identified from design brief
		1.3	Switchboard safety and regulatory requirements are identified, obtained and applied
		1.4	Design development work is planned in consultation with relevant person/s involved with the work to meet scheduled timelines
2	**Develop switchboard design**	**2.1**	Relevant performance standards, compliance methods and electrical equipment are applied to switchboard design in accordance with relevant industry standards
		2.2	Alternative switchboard design/s is developed in accordance with the design brief
		2.3	Safety, functional and budgetary considerations are incorporated in switchboard design
		2.4	Switchboard design draft is checked in accordance with design brief and relevant industry standards
		2.5	Switchboard design is documented for submission to relevant person/s for acceptance and approval
		2.6	Unplanned situations are dealt with in accordance with workplace procedures
3	**Obtain approval for installation design**	**3.1**	Switchboard design is documented and presented to client representative and/or relevant person/s
		3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final design is documented and approval obtained from relevant person/s
		3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing a > (greater than) 400 A three phase, 20 kilowatt (kw) fault level switchboard must include at least the following:

- control for essential and general supply
- metering
- sub-main controls
- local final sub-circuit distribution board
- fault indicators

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG130A Design switchboards rated for high fault levels (greater than 400 A).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0038 Design switchboards rated for high fault levels (greater than 400 A)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying performance standards, compliance methods and electrical equipment to switchboard design
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- consulting with relevant person/s in planning design work
- identifying scope of switchboard design brief
- monitoring quality of work
- planning to meet scheduled timelines
- preparing to design switchboards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- switchboard design of low voltage (LV) switchboards rated for high fault currents, including:
  - trade calculations encompassing:
    - mathematical techniques
    - relevant calculations
    - linear measurement, areas, volumes and ratios
  - engineering mechanics encompassing:

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- base physical quantities
- concepts, principles, International System of Units (SI) units, their applications in engineering calculations in relation to physical quantities and associated formulae
- mass, velocity, acceleration, force, weight, density and angles
- energy/work/power
- moments/torque
- centre of gravity
- mechanical advantage
- levers
- pulley blocks
- efficiency
- friction
- vectors
- resolution of forces
- forces in strung conductors
- forces on poles and towers
- determination of sag
- pressure/stress
- elementary fluid mechanics

- engineering materials encompassing:
  - classification
  - ferrous and non-ferrous metals
  - steels and alloys
  - properties
  - tensile strength
  - temperature and expansion in metals
  - stress and strain
  - ductility
  - applications
  - corrosion
  - galvanic corrosion
  - hardwoods and soft woods
- fault current calculations encompassing:
  - calculation of fault currents
  - calculation/determination of positive, negative and zero sequence impedances
  - determination of fault current breaking and let-through energy capacities of protection devices
  - the influence of fault/arc impedances
  - impedances operative for phase-to-phase and phase-to-earth faults
  - calculation of fault currents for phase-to-phase and phase-to-earth faults

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    - approximation calculations by selecting the components with the major impedance
- problem-solving techniques
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing switchboards rated for high fault levels
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design, install, inspect and test to verify an electrical installation is safe and complies with regulatory requirements.

It includes working safely; designing, installing, commissioning and fault finding of electrical installations; visual inspections and mandatory testing; following workplace procedures; and completing mandatory reporting requirements.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the requirements of this unit and its prerequisite requirements.

A 'licensed electrician' who requires this unit to demonstrate currency for regulatory purposes may be required to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case they are deemed to have met the prerequisites for this unit provided that they hold a current 'electricians licence' or its equivalent issued in an Australian state or territory; and, have recently been in employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.

Pre-requisite Unit

HLTAID001 Provide cardiopulmonary resuscitation

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, dismantle and assemble utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

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UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuit

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0047 Identify, shut down and restart systems with alternate supplies

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

UETTDRRF06 Perform rescue from a live LV panel

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design, install, inspect and test an electrical installation	**1.1** WHS/OHS control measures for the site are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards, which have not previously been identified, are noted and risk control measures are implemented
	1.4 Installation documentation and/or relevant industry standard are reviewed and applied
	1.5 Appropriate person/s is consulted to ensure work is coordinated with others involved on the worksite
	1.6 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	1.7 Circuits, machines and/or plant are isolated in accordance with WHS/OHS job requirements and workplace procedures
	1.8 Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s
	1.9 Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements
	1.10 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.11 Preparatory work is checked to ensure it complies with planned specifications and no damage has occurred
2 Select wiring systems, cables, control and protection for general	**2.1** Wiring system is selected and suitable for the environments in which it will operate

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electrical installations		
	2.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards
	2.3	Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit protection in accordance with relevant industry technical standards
	2.4	Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards
	2.5	Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents in accordance with relevant industry technical standards
	2.6	Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements
	2.7	Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with relevant industry technical standards
3 Install low voltage (LV) wiring and associated accessories	**3.1**	Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements
	3.2	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	3.3	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken
	3.4	Defects revealed through ongoing compliance and safety inspection and tests are rectified
4 Install and connect LV appliances, switchgear and associated accessories	**4.1**	Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance

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	4.2	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements
	4.3	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken
	4.4	Defects revealed through ongoing compliance and safety inspection are rectified
5 Visually inspect and conduct safety testing on electrical installation	**5.1**	Wiring is checked for suitability within the environments in which it is installed to ensure it is suitably protected from damage or overheating in accordance with relevant industry standards
	5.2	Cable conductor sizes are compliant with current-carrying capacity, voltage-drop and fault-loop impedance limitations in accordance with relevant industry standards
	5.3	Protection methods and devices are verified as meeting coordination requirements for overload and short-circuit protection in accordance with relevant industry standards
	5.4	Switchgear and control gear rating is verified as being appropriate and meets functional requirements in accordance with relevant industry standards
	5.5	Electrical equipment inspection and testing evidence is cited and verified in accordance with WHS/OHS safety regulations
	5.6	Earthing system and components are located correctly, and conductor selection sizes are verified
	5.7	Markings on switchboards are checked for accuracy and clarity and comply with requirements
	5.8	Mandatory tests are conducted in accordance with relevant industry standards
	5.9	Testing is conducted to verify fault-loop impedance is sufficiently low and RCDs operate in accordance with relevant industry standards
6 Report inspection and test	**6.1**	WHS/OHS risk control work completion measures and

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findings	procedures are followed
	6.2 Worksite is cleaned and made safe in accordance with workplace procedures
	6.3 Non-compliance defects are identified and reported in accordance with workplace procedures
	6.4 Recommendations for rectifying defects are made in accordance with workplace procedures
	6.5 Mandatory documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing, installing and verifying compliance and functionality of at least two general electrical installations must include:

- a main switchboard supplying more than one circuit each for:
  - lighting
  - socket outlets
  - fixed appliances
- one installation must include a circuit supplying a three phase load
- one installation must include a safety service or alternate supply
- one installation must include a distribution board separate from the main switchboard

Unit Mapping Information

This unit replaces and is not equivalent to UEENEEG105A Verify compliance and functionality of low voltage general electrical installations.

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Links

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Assessment Requirements for UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- safely measuring the parameters for the whole or any part of a direct current (d.c.) circuit
- safely isolating circuits/equipment, including:
  - preparing a safe work method statement (SWMS) or job safety analysis (JSA) for effective safe isolation
  - identifying source of supply to be isolated
  - applying switching-off, lock-out and tagging procedures
  - applying safe methods for confirming isolation
- determining maximum demand and selecting cables for an installation, including mains, sub-mains and final sub-circuits
- selecting suitable equipment and switchgear for a particular installation or part of an installation for compliance with industry standards
- determining the maximum fault-loop impedance for a circuit
- determining protective conductor and active conductor sizes for each circuit to ensure earth fault-loop impedance is sufficiently low to operate the circuit protective device
- installing and terminating consumer's mains for an installation in accordance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and local supply authority requirements, including:
  - unprotected consumers mains to minimise the risk of short circuit current
  - drawing-in, placing and fixing cables
  - cable and conductor terminations
  - correct preparation for fitting and connection of electricity network operator equipment
  - ensuring correct polarity
- selecting and installing control and protection devices in accordance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- installing and terminating sub-circuit cabling at switchboards and connection to accessories,

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including:

- drawing-in, placing and fixing cables
- application of accessories
- correct interconnection between switchgear, protection devices and links
- use of adequately sized cables
- correct marking of equipment
- clear identification of circuit neutral conductors
- correct polarity

- completing visual inspection of installations for compliance with industry standards
- conducting and reporting mandatory testing to ensure:
  - insulation resistance of mains, sub-mains and final sub-circuits in accordance with regulatory requirements
  - earth continuity of the main earthing conductor, protective earthing conductors, combined protective earthing and neutral (PEN) conductors, and bonding conductors in accordance with regulatory requirements
  - polarity of active, neutral and earth conductors in accordance with regulatory requirements
  - correct connections of active, neutral and protective earthing conductors are tested to ensure no short circuits between conductors, no transposition of conductors that could result in the earthing system or exposed conductive parts becoming energised, and no interconnection of conductors between different circuits, in accordance with regulatory requirements
  - verification that earth fault-loop impedance limitations are not exceeded in accordance with regulatory requirements
  - residual current devices (RCDs) have been correctly installed, their function verified, and the isolation of all switched poles verified in accordance with regulatory requirements
- identifying causes of non-compliance from test results
- identifying and rectifying faults in electrical circuits and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical safety, including:
  - safety workplace procedures for working on electrical systems, circuits and apparatus
  - safe working practices as a normal part of carrying out electrical installation work
  - isolation and lock-out workplace procedures
  - tools and equipment needed to conduct electrical installation compliance inspection and testing
  - relevant emergency response plan and first aid requirements
  - selection and use of fire extinguishers to control an electrical fire at an accident site

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- WHS/OHS, including:
  - legislation and regulations and the fundamental principles that apply
  - identifying potential workplace hazards
  - procedures for undertaking safety checks
  - working with a group to identify effective hazard control measures
  - working with a group to modify and/or develop safe work methods
  - techniques for the identification, control and reporting of hazardous substances/materials
  - awareness and reporting of asbestos, silica and hazardous gases
  - legal responsibilities for employers and employees
  - WHS/OHS practices
  - employers' and employees' own "duty of care"
  - safety committees and their role
  - development, modification and application of SWMS or JSA
  - purpose and process of reporting WHS/OHS incidents
  - safety procedures for working with electrical circuits and equipment
  - procedures for safe and effective isolation of electrical supply
  - regulations for the supervision of apprentices and trainees
  - selection and use of fire extinguishers to control electrical fire at an accident site
- methods to rescue a person in contact with live electrical conductors or equipment, including:
  - safety of the rescuer
  - establishing the source voltage level
  - rescue process 'dos' and 'don'ts'
- application of emergency first aid requirements for an electric shock victim, including:
  - calling for help
  - initiating first aid
  - applying cardiopulmonary resuscitation (CPR)
- dangers of high voltage (HV) equipment and distribution systems, including:
  - step, touch and induced voltages
  - sources of induced voltage and stored energy
  - creepage and clearance requirements
  - application of safe working procedures in the vicinity of HV equipment
- effects of electric current, including:
  - physiological effects of current
  - principles by which an electric current can produce heat, light, motion and a chemical reaction
- single path d.c. circuits including:
  - arrangement of energy source, protection device, switch and load in a circuit
  - purpose of each component in the circuit
  - consequences of open circuits, closed circuits and short circuits
- multiple path d.c. circuits, including:

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  - circuit configurations and connection of energy source, protection device, switch and load in a circuit
  - relationship between the parameters of voltage, current, resistance and power dissipation in the whole or any part of the circuit
  - methods of determining circuit behaviour for variation in any of the parameters from measured and calculated values
- alternating voltage and current generation, phase relationships, energy in an alternating current (a.c.) circuit, including:
  - sinusoidal voltage generation and resulting current
  - terms: period, maximum value, peak-to-peak value, instantaneous value, average value, root-mean-square (RMS) value and frequency
  - three phase generation
  - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
  - method of determining the phase sequence or phase rotation of a three phase supply
  - methods of determining power and energy supplied by three phase circuits
- techniques to read, sketch and interpret electrical diagrams, including:
  - conventions used in documenting electrical information
  - interpreting schematic, block and wiring diagrams, plans and schedules
  - sketching and marking up electrical drawings and diagrams
- safe isolation of equipment, including:
  - requirements and techniques for preparation of a SWMS or JSA for effective safe isolation
  - safe methods for identifying source of supply to be isolated
  - switching-off, lock-out and tagging procedures
  - safe methods for confirming effective and safe isolation
  - following safe testing procedures
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements for dealing with unused conductors and equipment
- fundamental safety principles of AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), including:
  - definition of terms
  - direct contact with live parts
  - indirect contact with live parts
  - thermal effects of current
  - over-current
  - earth faults
  - abnormal voltages
  - spread of fire
  - mechanical injury
  - external influences

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  - fundamental principles of installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs), and verification of compliance
- protective and functional earthing, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
  - purpose of protective and functional earthing
  - parts of a protective earthing system
  - earthing arrangements, earthing of equipment and equipotential bonding
  - methods of determining the earth fault-loop impedance for a circuit
  - alternate earthing systems only when required by local regulatory authorities (e.g. TT low voltage supply earthing system in dairy sheds in New Zealand)
- protective earthing conductor and active conductor sizes for each circuit to ensure earth fault-loop impedance is sufficiently low to operate the circuit protective device
- multiple earthed neutral (MEN) system and its application, including:
  - protective earthing (PE) and neutral (N) conductors in a consumer's installation and their relationship to the protective earth neutral (PEN) conductor in the electricity distributor's system or sub-main to an outbuilding
  - importance of the MEN link when a fault occurs
  - likely consequences of the absence of the MEN link or high impendence in the PEN conductor when a fault occurs
  - requirements for installation of a MEN link in an installation and an outbuilding
- control and protection requirements for installations and equipment, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
  - minimum fault levels specified by electricity distributors
  - method for assessing prospective short circuit current
  - devices for protection against overload and short circuit current
  - methods and arrangement for protection against short circuit currents, overload and earth leakage currents
  - coordination of overload and short circuit protection devices
  - coordination between conductors and overload protection devices
  - causes of over-voltage and under-voltage
  - device requirements for protection against over-voltage and under-voltage
  - selection and installation of RCDs
  - limitation of an RCD to protect against contact with live parts
  - devices for functions of isolation, emergency, mechanical maintenance and functional control
- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements for installation of separated extra-low voltage (SELV) and protected extra-low voltage (PELV) systems, including:
  - purpose and configuration of PELV and SELV

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    - earthing requirements and testing of SELV and PELV circuits
- cable selection for single and three phase mains and sub-mains for single and multiple installations including:
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - AS/NZS 3008.1.1 Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation condition requirements for selection of cables
    - methods of determining maximum demand
    - selecting cables for a given situation based on:
        - suitability of the cable insulation
        - installation methods and external influences affecting cable current-carrying capacity
    - fault-loop impedance
    - effects of harmonic current on cable current-carrying capacity
    - installation methods and external influences affecting cable current-carrying capacity
    - voltage-drop limitation
    - short circuit performance consideration
- cable selection for final sub-circuits, including:
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - AS/NZS 3008.1.1 Electrical installations - Selection of cables Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation condition requirements for selection of cables
    - maximum demand on final sub-circuits
    - selecting cables for a given situation based on:
        - suitability of the cable insulation
        - installation methods and external influences effecting cable current-carrying capacity
    - effect of earth fault-loop impedance and voltage-drop limitations on circuit route length
- installation of electrical equipment in given damp situations, including:
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - areas specified as damp situations
    - limitation on the installation of equipment in classified zones
    - selection and location of equipment suitable for installation in given classified zones
    - use of RCD, SELV and PELV for damp situations
    - equipotential bonding in showers and bathrooms and swimming and spa pools
- methods for the installation, modification and testing of electrical installations and equipment for construction and demolition sites, complying with AS/NZS 3012 Electrical installations - Construction and demolition sites and applicable workplace safety legislation, including:
    - supply requirements
    - switchboards for the purpose of construction and demolition

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  - protection of circuits
  - construction wiring
  - lighting
  - socket outlets
  - circuits for lifts
  - calibration of instruments
  - inspection and testing methods
  - initial and periodic inspection and testing
- installation of aerial conductors and underground wiring, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
  - types and application of aerial conductors
  - aerial span limitations and required clearances
  - selection of aerial supporting poles/post and struts for a given application
  - use and requirements of catenary support systems
  - acceptable cable types and protection for underground wiring categories
  - underground wiring depth and protection
  - underground wiring clearances from other services
- electrical installations in hazardous areas, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
  - types of areas classified as a hazardous area
  - standards to which the selection, installation, inspection and maintenance of electrical equipment shall comply
  - additional training required to work competently with electrical equipment for hazardous areas
- installation and termination requirements for electrical cables, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
  - typical cable routes through buildings, structures and premises
  - application of wiring accessories
  - drawing-in, placing and fixing of cables
  - cable and conductor terminations
  - maintaining fire rating integrity
  - application of flat thermoplastic sheathed (TPS), circular TPS, steel wire armoured (SWA), fire rated and flexible cables
- requirements for the installation and connection of consumers mains, including:
  - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and local supply authority requirements
  - underground and overhead consumers mains
  - terminating consumers mains at pillars, pits, mains connection boxes and consumers

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switchboard
    - unprotected consumers mains to minimise the risk of short circuit current
    - bonding conductors where required
    - ensuring correct polarity
- termination of sub-circuit cabling at switchboards and connection to components, including:
    - correct interconnection between switchgear, protection devices and links'
    - correct preparation for fitting and connection of local supply authority equipment
    - use of adequately sized cables
    - correct marking of equipment
    - clear identification of circuit neutral conductors
    - correct polarity
- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements and supply authority requirements to install final sub-circuit wiring into switchboards and connection to switchboard equipment
- location of switchboards and arrangement of switchboard equipment in installations, including:
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - accessibility and restricted locations of switchboards
    - identification of main switchboards
    - construction requirements of switchboards
    - arrangement and identification of switchboard equipment
    - arrangement and installation of metering equipment
    - switchboard wiring and fire-protective measures
    - protection against switchboard internal arc faults
- key safety issues of transformers and AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements, including:
    - risks and safety control measures associated with connection and disconnection of instrument transformers
    - safe working procedures when connecting and testing transformers
    - requirements and restrictions on the installation and use of transformers
- electric motor selection, starting method and overload protection, including:
    - types of motor enclosures suitable for given environmental conditions
    - criteria for selecting motor starters and overload protection
    - types and connection arrangements for direct-on-line, reduced voltage starters and variable speed drives
    - thermal, magnetic and thermistor overload protection methods
- legislated regulations, including:
    - legislation and regulations that require installations and equipment to be inspected and tested to ensure they are safe
    - responsible persons/bodies for ensuring electrical installations are safe

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    - results of tests that show an electrical installation is safe for connection to supply
- verification of compliance of an electrical installation, including:
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - requirements for visual inspection to determine installation compliance with relevant specific installation standards
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) mandatory test requirements and the application of mandatory tests following guidance of AS/NZS 3017 Electrical installations - Verification guidelines
- mandatory testing of an electrical installation including:
    - earth continuity, insulation resistance, polarity, sub-mains and final sub-circuits, correct circuit connections, earth fault-loop impedance and RCD operation
    - functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device
    - tests that show all circuits and devices operate as intended
    - techniques to determine fault level at a particular point in an installation
- documentation, including:
    - results of tests conducted on an installation to comply with requirements and ensure the installation is safe
    - documentation of the results of testing an installation as required by the electricity distributor
    - documentation of periodic inspection and testing of construction site wiring and equipment in accordance with requirement
    - documentation of periodic testing and inspection of electrical equipment, including tagging requirements
- systematic method of commissioning and decommissioning electrical equipment and installations, including:
    - commissioning, including:
        - circuit voltage testing
        - phase rotation and polarity checks
        - systematic loading up
        - correct installation functioning
        - instrument/control parameter checks
        - dangers of mechanical damage to cables and equipment
    - decommissioning, including:
        - identification of all circuits
        - impact on other equipment
        - isolation
        - tagging
        - testing
        - securing and earthing where required

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    - safe removal of equipment and termination of unused cable
    - dangers of mechanical damage to cables and equipment
- diagnosing and rectifying faults in electrical apparatus and associated circuits, including:
    - recognising symptoms of open circuit, short circuit, incorrect connections, insulation failure, unsafe condition, apparatus/component failure and related mechanical failure
    - methods and tests to identify faults in circuits and/or equipment
    - ensuring fault rectification/repair and/or equipment replacement complies with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and other relevant standards.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current 'Unrestricted Electricians Licence' issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licensing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0040 Develop compliance policies and plans to conduct an electrical contracting business

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop compliance policies and plans to conduct an electrical contracting business.

It includes the developing a business plan and workplace policies to ensure regulatory requirements are met in conducting a contracting electrical business.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare business plan and compliance policies	**1.1** Factors influencing the performance of a contracting business are investigated and evaluated
	1.2 Information and advice are sought on the effects of legislated requirements on the operation

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	1.3	Formal processes to meet compliance, managerial, occupational and workplace relations obligations are identified
	1.4	Focus of the business is identified from investigation of market opportunities and financial climate
2 Develop business plan and compliance policies	**2.1**	Policies are determined and developed to ensure occupational aspects of work meet all legislated requirements
	2.2	Policies are determined and developed to ensure compliance aspects of work meet all legislated requirements
	2.3	Policies are determined and developed to ensure managerial and workplace relations aspects of work meet all legislated requirements in accordance with relevant industry standards
	2.4	Procedures and processes are developed to support business policies and industry standards
	2.5	Methods are developed in business procedures to maintain occupational, compliance, managerial and workplace relations developments
	2.6	Policies, plans and workplace procedures are reviewed in consultation with appropriate person/s and changes made as required
	2.7	Plans, policies and procedures are documented in accordance workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG175A Develop compliance policies and plans to conduct a electrical contracting business.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0040 Develop compliance policies and plans to conduct an electrical contracting business

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- evaluating factors influencing the performance of a contracting business accurately
- identifying the formal processes for meeting legislated obligations
- establishing an appropriate focus for the business
- establishing policies to ensure all legislated requirements and standards are met
- developing procedures and processes to give effect to established policies
- giving written justification of solutions provided
- dealing with unplanned events
- applying relevant industry standards
- applying relevant legislation
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- developing business plan and compliance policies, including:
  - completing documentation
  - developing methods to maintain procedures
  - reviewing policies, plans and procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical contracting plans and compliance policies for a contracting business, including:
  - enterprise regulatory requirements and non-regulatory standards:
    - compliance regulations for businesses
    - methods of meeting compliance
    - non-regulatory standards and their effects on business
  - electricity distributors and supply requirements:
    - general requirements for the supply of electricity
    - supply and metering requirements

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    - acceptable arrangement of switchgear and control gear
    - acceptable earthing methods and arrangements
  - electricity regulatory safety requirements:
    - regulatory requirements for ensuring the safety and integrity of electrical installations
    - regulatory requirements relative to the jurisdiction for which competency is sought
    - types and scope of electrical inspections and safety audits
    - authority of electrical inspectors
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications
- relevant quality workplace procedures
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0041 Develop engineering solution for synchronous machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions for synchronous machine and control problems.

It includes applying safe working practices; determining problems; obtaining synchronous machine operation, construction and application; gathering and analysing solutions; applying problem-solving techniques; and developing and documenting solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0062 Provide engineering solutions to problems in complex polyphase power circuits

UEECD0036 Provide engineering solutions for problems in complex multiple path circuit

UEECD0039 Provide solutions to basic engineering computational problems

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0041 Solve electrotechnical engineering problems

or

UEECD0043 Solve problems in direct current circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

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and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

or

UEEEC0065 Solve problems in basic electronic circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for synchronous machine problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of synchronous machine problem is determined from performance specifications and/or documentation and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work
	1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering	**2.1** WHS/OHS risk control measures and workplace

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	solution		procedures for carrying out the work are followed
		2.2	Synchronous machine construction, operation, characteristics and applications are applied to developing solutions to synchronous machine problems
		2.3	Parameters, specifications and performance requirements for each machine problem are obtained in accordance with workplace procedures
		2.4	Approaches to resolving synchronous machine problems are analysed to provide most effective solutions in accordance with relevant industry standards and workplace procedures
		2.5	Unplanned events are dealt with safely and effectively in accordance with relevant industry standards and workplace procedures
		2.6	Quality of work is monitored in accordance with relevant industry standards and workplace procedures
3	**Implement engineering solution and complete documentation**	**3.1**	Solutions to machine problems are tested to determine their effectiveness and modified as required
		3.2	Adopted solutions are documented, including instruction for their implementation with risk control measures
		3.3	Relevant person/s required to implement solutions to synchronous machine problems is coordinated in accordance with relevant industry standards and workplace procedures
		3.4	Justification for solutions used to solve synchronous machine problems is documented in work/project records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions must include the following:

- at least four synchronous machine problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG143A Develop engineering solution for synchronous machine and control problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0041 Develop engineering solution for synchronous machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the machine problem
- forming effective strategies for solution development and implementation
- obtaining machine parameters, specifications and performance requirements appropriate to each problem
- testing and applying solutions to machine problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying synchronous machine construction operation characteristics and applications to developing solutions
- determining the scope of synchronous machine problem
- monitoring quality of work
- planning activities to meet timelines.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- synchronous machine diagnostics and engineering solutions for synchronous machine problems, including:
  - alternating current (a.c.) generators – construction, types and cooling encompassing:
    - construction of stator and rotor windings

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  - rotor construction (cylindrical and salient pole)
  - advantages of rotating field construction
  - excitation methods
  - cooling methods
  - prime movers
- a.c. generators – operating principles and characteristics encompassing:
  - a.c. generator equivalent circuits (synchronous reactance and resistance components)
  - tests – open circuit, short circuit and stator impedance
  - voltage regulation, island generator's terminal voltage load power factor
  - determination of excitation voltage and load angle
- synchronising a.c. generators encompassing:
  - conditions for synchronising (infinite bus)
  - methods for synchronising (lamp methods and synchroscope)
  - alternator load sharing, parallel operation
- a.c. generators power, torque and efficiency encompassing:
  - power input, input torque and speed
  - power losses
  - output power, load power factor, rotor angle and pu power
  - efficiency
  - performance chart interpretation
- automatic voltage regulation (AVR) encompassing:
  - need for AVRs
  - features of AVRs
  - effects of rotor inductance
  - connections of AVRs
  - operation of AVRs
- a.c. generator operational stability encompassing:
  - power output, variance (VAR) effects, rotor angle and excitation
  - control of VAR (on-load tap-changers (OLTC) transformers)
  - voltage dependant nature of stability
  - critical clearance angle of a.c. generator
  - stability limits
- a.c. generator protection encompassing:
  - restricted, unrestricted primary, back up and duplicated protection
  - overcurrent, short circuit, differential, reverse power, load unbalance, rotor overload, loss-of-field, rotor earth fault, station earth-fault and under-frequency protection
  - external fault protection
- induction generator encompassing:
  - types operating principles and characteristics
  - excitation methods

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    - losses and efficiency
    - synchronising and paralleling
  - three phase synchronous motors encompassing:
    - construction – rotor, stator and windings
    - excitation methods
    - operating principles (equivalent circuits and synchronous impedance)
    - hunting and stability limits
    - power factor correction
    - paralleling and synchronisation techniques
    - starting methods
    - braking methods
- problem-solving techniques
- relevant machine parameters, specifications and performance requirements
- relevant manufacturer specifications and operating instructions/manuals
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solution for synchronous machine problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0042 Develop engineering solutions for d.c. machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions for direct current (d.c.) machine and control problems.

It includes working safely; determining problem; obtaining direct current d.c. machine operation, construction and application; gathering and analysing data; applying problem-solving techniques; and developing and documenting solutions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V d.c..

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0036 Provide engineering solutions for problems in complex multiple path circuit

UEECD0039 Provide solutions to basic engineering computational problems

and

UEECD0041 Solve electrotechnical engineering problems

or

UEECD0043 Solve problems in direct current circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

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or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

or

UEEEC0065 Solve problems in basic electronic circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for d.c. machine problems	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of d.c. machine problem is determined from performance specifications and/or documentation and in consultation with relevant person/s

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		1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work
		1.5	Strategies are formed to ensure solution development and implementation is carried out efficiently
2	**Develop engineering solution for d.c. machine problems**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2	Relevant d.c. machine construction operation characteristics and applications are applied to developing solutions to d.c. machine problems
		2.3	Parameters, specifications and performance requirements to each machine problem are obtained in accordance with workplace procedures
		2.4	Approaches to resolving d.c. machine problems are analysed to provide most effective solutions
		2.5	Unplanned events are dealt with safely in accordance with relevant industry standards and workplace procedures
		2.6	Quality of work is monitored in accordance with relevant industry standards and workplace procedures
3	**Implement engineering solution and complete documentation**	**3.1**	Solutions to machine problems are tested to determine their effectiveness and modified as required
		3.2	Adopted solutions are documented and instructions for implementation with risk control measure developed
		3.3	Relevant person/s required to implement solutions to d.c. machine problems is coordinated in accordance with relevant industry standards and workplace procedures
		3.4	Justification for solutions used to solve d.c. machine problems is documented in work/project records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions must include the following:

- at least two different d.c. machines using different control systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG144A Develop engineering solutions for d.c. machine and control problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0042 Develop engineering solutions for d.c. machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the machine problem
- forming effective strategies for solution development and implementation
- obtaining machine parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to machine problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- determining the scope of direct current (d.c.) machine problems
- planning activities to meet timelines
- analysing approaches to solutions
- monitoring quality of work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- d.c. machine diagnostics and engineering solutions for d.c. machine problems, including:
  - basic d.c. machine construction and operation encompassing:
    - general principles of operation
    - applications of d.c. machines
    - construction of d.c. machines
    - d.c. machine configurations; series, shunt, compound long shunt and compound short

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shunt
    - armature and field currents
    - insulation
    - ratings
    - cooling paths
    - bearings
    - general maintenance of d.c. machines
- construction and use of lap and wave windings encompassing:
    - coils and elements
    - generated voltage equation for generator
    - generated voltage equation for motors
    - application of lap and wave windings
- commutation process encompassing:
    - use of interpoles
    - loading of machines
    - brush shifting
    - brush selection
    - classes of brush grades:
        - natural graphite, hard carbon, electrographite, metal-graphite and metal-carbon, "treated" grades
    - carbon brush contact characteristics:
        - specific resistance, thermal conductivity, density and porosity, elastic properties and contact properties
    - carbon brush factors:
        - pressure, current, polarity and speed
    - brush construction:
        - dimensions, tolerances, preferred sizes, surfaces, edges, bevels, flexible shunts, connection of flexible shunt to brush and insulation of flexible connections
    - brush holders:
        - types, brush angles, trailing holders, reaction holders, top bevel angles, reversible rotation, cantilever holders, effective arc of contact, construction of brush holders and pressure mechanism
    - mounting of brush holders and brushes:
        - clearances, brush angle, brush arm spacing, alignment, staggering, brush bedding and brush pressure
    - brush operation:
        - temperature rise, number and size of brushes, current distribution between brushes, slotting brushes, polarity effects, arc of contact, materials for commutators and mica
    - selection of brush grades:
        - machine data, current density, commutator peripheral speed, brush arc, pitch of

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segments, number of segments covered by brush and cooling surface

- armature reaction in d.c. machines encompassing:
  - effect of armature reaction on d.c. machine characteristics
  - use of compensating winding
- d.c. generators encompassing:
  - relative advantages and disadvantages of the various d.c. generator configurations and their performance under various load conditions
  - voltage regulation as a percentage or per unit value
  - operation in parallel
- d.c. motors encompassing:
  - relative advantages and disadvantages of the various d.c. motor configurations and their performance under various load conditions
  - shape of motor speed/torque curves
  - reversal of rotation
- starting and protection of d.c. motors encompassing:
  - types of d.c. motor starters in use
  - d.c. motor protection
- speed regulation and speed control of d.c. motors encompassing:
  - methods in use
  - effect on motor design and operation caused by the use of SCR
  - speed control equipment
- braking of d.c. motors encompassing:
  - plugging
  - dynamic
  - regenerative
  - mechanical
- losses, heating and efficiency encompassing:
  - copper losses
  - iron losses
  - mechanical losses
  - efficiency
- acceleration of d.c. motors and loads encompassing:
  - characteristics of typical loads
  - matching a suitable motor to a given load
  - heating of windings
  - derating of motors
- special d.c. motors construction, operation and applications encompassing:
  - permanent-magnet motors
  - brushless motors (e.c. motors)
  - coreless and moving coil motors

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    - linear motors
    - printed circuit motor
    - stepping motors
    - voice-coil motors
  - maintenance of d.c. machines encompassing:
    - routine maintenance
    - breakdown repairs
  - types of faults encompassing:
    - brushes/brush gear problems:
      - sparking, excessive heating, excessive wear of brushes, commutator or slip rings, bad surface conditions, excessive maintenance, flexible burning, flexible corrosion, separation or grooving, blackening, copper picking, copper dragging and brush noise
  - adjustment of machines encompassing:
    - correct brush position
    - machining and finishing of commutators
- problem-solving techniques
- machine parameters, specifications and performance requirements
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solutions for d.c. machine problems

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0043 Develop engineering solutions for induction machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions for induction machine and control problems.

It includes working safely; determining problems; obtaining induction machine operation, construction and application; gathering and analysing solutions; applying problem-solving techniques; and developing and documenting solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0062 Provide engineering solutions to problems in complex polyphase power circuits

UEECD0036 Provide engineering solutions for problems in complex multiple path circuit

UEECD0039 Provide solutions to basic engineering computational problems

and

UEECD0041 Solve electrotechnical engineering problems

or

UEECD0043 Solve problems in direct current circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

or

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

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UEEEC0065 Solve problems in basic electronic circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for induction machine problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of induction machine problem is determined from performance specifications and/or documentation and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work
	1.5 Strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering solution	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Induction machine construction, operation, characteristics and applications are applied to developing solutions to induction machine problems
	2.3 Parameters tested, data taken, specifications and performance requirements to each machine problem are obtained in accordance with workplace procedures

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	2.4	Approaches to resolving induction machine problems are analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively in accordance with relevant industry standards and workplace procedures
	2.6	Quality of work is monitored in accordance with relevant industry standards and workplace procedures
3 Implement engineering solution and complete documentation	**3.1**	Solutions to machine problems are tested to determine their effectiveness and modified as required
	3.2	Adopted solutions are documented, including instruction for implementation with risk control measures
	3.3	Relevant person/s required to implement solutions to induction machine problems is coordinated in accordance with relevant industry standards and workplace procedures
	3.4	Justification for solutions used to solve induction machine problems is documented in work/project records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions must include the following:	• at least two induction machine problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG145A Develop engineering solutions for induction machine and control problems.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0043 Develop engineering solutions for induction machine and control problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the machine problem
- forming effective strategies for solution development and implementation
- obtaining machine parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to machine problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- determining the scope of induction machine problems
- monitoring quality of work
- planning activities to meet timelines.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- induction machines diagnostics and engineering solutions for induction motor problems, including:
  - operating principles of polyphase induction motors encompassing:
    - rotating magnetic field torque slip
    - MMF relationships
    - leakage fluxes

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- construction of polyphase induction motors encompassing:
  - squirrel cage motors
  - slip-ring motors
  - construction considerations in minimisation of tooth locking
- speed-torque relationships in induction motors encompassing:
  - maximum torque
  - torque – slip relationships
  - squirrel cage rotor types
  - power flow in the motors
  - power distribution
  - torque units
  - slip ring rotors
- induction motor performance testing encompassing:
  - no-load tests
  - locked rotor tests
  - development of motor equivalent circuit from test results
  - analysis of motor performance using circle diagrams
- induction motor starters encompassing:
  - starting requirements
  - type of starters
  - starting torque
  - starting dynamics
  - static friction
  - mechanical loads
  - starting duration
- reduced voltage starting encompassing:
  - starting dynamics
  - change over conditions
  - starting duration
  - acceleration curves
- speed control of induction motors encompassing:
  - constant torque, constant power concepts
  - torque-flux-voltage relationships
  - rotor resistance control
  - stator impedance control
  - variable frequency control (e.g. PAM, PWM and flux vector control)
- braking of induction motors encompassing:
  - electrical braking systems (plugging, direct current (d.c.) dynamic, regenerative and capacitor-magnetic)
  - mechanical braking systems (mechanical drum, demag and eddy current)

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- motor protection encompassing:
  - overload
  - earth fault
  - phase failure
- motor selection criteria and RMS rating
- induction motor maintenance/repair encompassing:
  - routine maintenance schedules
  - type of repairs (mechanical and electrical)
- single phase induction motors encompassing:
  - operating principles (especially RMF)
  - construction types
  - speed-torque relationships
  - testing
- relevant induction machine construction, operation, characteristics and applications, including driven load and duty cycle
- relevant machine parameters, specifications and performance requirements
- relevant manufacturer specifications and operating instructions/manuals
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solutions for induction machine problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0044 Diagnose and rectify faults in complex lift systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in a lift system.

It includes diagnosing and rectifying faults in complex lift system and equipment, and completing reporting and rectification activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0045 Diagnose and rectify faults in traction lift systems

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0018 Diagnose and rectify faults in digital controls systems

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose a lift system fault	**1.1** WHS/OHS workplace procedures for a given work area are identified and applied
	1.2 Scope of work to be undertaken is determined from maintenance procedures, fault/breakdown reports and/or discussions with appropriate person/s
	1.3 Advice is sought from the work supervisor to ensure the work is coordinated effectively with relevant others
	1.4 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with workplace procedures and checked for correct operation and safety

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2	**Diagnose and rectify lift system faults**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work activities are followed
		2.2 Circuits/machines/plant are isolated in accordance with relevant industry standards and workplace procedures
		2.3 Safety hazards resulting from the fault and/or breakdown are documented and risk control measures implemented in consultation with appropriate person/s
		2.4 Diagnostics are applied to apparatus, equipment and systems to identify fault/s
		2.5 Suspected fault scenarios are tested as cause/s of system fault
		2.6 Cause of the fault is identified and appropriate person/s engaged to rectify the fault
		2.7 Faults in the lift components of the system are rectified in accordance with apparatus and system industry operational standards
		2.8 Apparatus, equipment and system/s are verified and tested to meet required industry standards
		2.9 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
		2.10 Diagnosis and rectification activities are carried out efficiently without waste of materials or damage to apparatus, the environment or services using sustainable energy practices
3	**Complete work and report fault diagnosis and rectification activities**	**3.1** Reusable, faulty or worn components are tagged and despatched for repair in accordance with workplace procedures
		3.2 Rectification of faults is documented in accordance with workplace procedures
		3.3 Rectification of faults is reported and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG168A Diagnose and rectify faults in complex lift systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0044 Diagnose and rectify faults in complex lift systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- releasing passengers from a lift which has become immobilised
- diagnosing and repairing faults in lift circuits and associated components for at least three types of lift circuits/components, including:
  - governors
  - brakes
  - safety gear
  - safety devices
  - lift machines
  - door components
  - controllers
- replacing and/or adjusting lift equipment in at least three types of lift equipment as described below:
  - electro-hydraulic lift
  - electric traction lift
  - passenger lift
  - goods lift
- dealing with unplanned events
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- diagnosing and rectifying faults, including:
  - inspecting, testing and measuring live electrical work
  - obtaining and checking tools, equipment, resources and testing devices
  - using diagnostic methods
- following workplace procedures and instructions
- reporting fault diagnosis and rectification activities, including:
  - completing documentation.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- lift components and systems - electrical/electronic, including:
  - traction lifts encompassing:
    - lift control circuits (relay logic only): floor selector circuitry
    - machine room control (selector) and well control (transducer) circuitry - direction slowing and stopping, re-levelling, door operator, acceleration, button, indicator/lantern, lights and emergency lights, travelling cables, key switch circuits, fans, main supply and power circuits
  - safety circuits encompassing:
    - type, operation and actuation
    - landing door locks, car door locks, emergency stop, pit switch, car trap-door switch, fire service, car top switch, tappet switch, governor switch, and safety gear switch, reverse phase relay, phrase failure relay and limit switches
  - maintenance, replacement and adjustment encompassing:
    - electrical and electronic lift components - travelling cables, tachometers, selectors, encoders and transducers
    - safety devices: overloads, circuit breakers, limit switches, terminal stopping, door protection, governors and safety gear/switches
  - electrical layout/drawings and special requirements encompassing:
    - lift code and AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) requirements
    - specific lift symbols
    - conduits
    - trailing cable
    - troughing
    - colour coding and labelling
    - segregation low voltage (LV)/extra-low voltage (ELV)
    - telephone and communication cabling
    - regulatory requirements and door lock wiring
  - safety drive adjustment encompassing:
    - emergency stop button
    - speed governor
    - reverse phase protection
    - broken chain/step switch
    - broken main drive switch
    - drive access switch
    - start pressure switch and landing guards/barriers
  - lift components – electronic encompassing:

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    - encoders
    - transducers
    - electronic boards
    - selectors
    - rectifiers
    - capacitors
    - resistors
    - processor board
    - input/output (I/O) board
- drives - types, construction and operation encompassing:
    - traction
    - gearless types:
        - speed/load characteristics, efficiency, application, brakes and electric prime mover (motor types and control)
    - geared types:
        - speed/load characteristics, efficiency, application, brakes and electric prime mover (motor types and control)
    - other types of lifts (drum, rack and pinion, chain and screw)
- fault finding encompassing:
    - visual inspection
    - performance checks and application of fault-finding principles
- relevant diagnostic methods
- relevant fault scenarios
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant rectification activities and procedures
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including fault reports, test results, authorisations, permits, parts/components, despatch and store records
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do

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so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0045 Diagnose and rectify faults in traction lift systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in traction lift systems and equipment.

It includes working safely; replacing and/or adjusting lift circuit and associated components; diagnosing and repairing faults in lift circuits and associated components, including governors, brakes, safety gear, safety devices, lift machines, door components and controllers.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

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UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify lift system faults	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for work are followed
	1.3 Scope of work to be undertaken is determined from workplace procedures or fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.5 Tools, equipment and testing devices to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify lift system faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed

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	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, as required, conducted within workplace safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from fault or breakdown are documented on job safety assessments, risks assessed and control measured implemented in consultation with appropriate person/s
	2.5	Logical diagnostic methods are applied to diagnose lift system apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.6	Suspected fault-finding scenarios are tested as being possible cause/s of lift system fault in accordance with workplace procedures
	2.7	Cause of lift system fault/s is identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the lift systems
	2.8	Fault/s in the lift components of the system is rectified to apparatus manufacturer specifications and lift system relevant operational standards
	2.9	System is inspected and tested to verify that the lift system operates as intended and to manufacturer specified requirements
	2.10	Control methods for dealing with unplanned situations are responded to on the basis of workplace safety and specified work outcomes
	2.11	Diagnosis and fault/s rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete rectification activities and documentation	**3.1**	WHS/OHS work rectification risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are tagged and

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despatched for repair in accordance with workplace procedures

3.3 Rectification of fault/s is documented in accordance with workplace procedures

3.4 Appropriate person/s is notified that the lift system fault/s has been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Replacing and/or adjusting of lift equipment must include at least three of the follow types of lift equipment:	• electric traction lift • electro-hydraulic lift • goods lift • passenger lift
Diagnosing and rectifying faults in lift systems must include at least three the following:	• brakes • controllers • door components • governors • lift machines • release passengers from a lift, which has become immobilised • safety devices • safety gear

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG116A Diagnose and rectify faults in traction lift systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0045 Diagnose and rectify faults in traction lift systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- completing and reporting fault diagnosis and rectification activities
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- diagnosing and rectifying faults in traction lift systems, including:
  - brakes
  - door components
  - governors
  - lift machines
  - safety devices
  - safety gear
- preparing to diagnose and rectify faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- brake types, function, operation, inspection and adjustment, circuitry and manual release, including:
  - brake circuitry
  - electrical operations, including stall motor, solenoid and hydraulic
  - geared machine brakes
  - gearless machine brakes
  - inspection and adjustment of mechanical and electrical brakes

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  - internal and external mechanical brakes
  - manual release devices and safety procedures
- communication at site
- electro-hydraulic lifts circuitry, controls and components, including:
  - electrical circuitry
  - faulty components diagnosis
  - governor switch
  - hydraulic circuitry
  - hydraulic components
  - levelling switch
  - over travel limits
  - pump motor and starter
  - servicing
  - stop button
  - up, down limit switches
  - up, down solenoids
- electro-hydraulic lifts - mechanical operation – fluid power principles and components, operation, arrangements, lift code and other requirements and emergency passenger release, including:
  - bleeding lines
  - control of hydraulic pressure
  - directional flow including pressure gauge
  - filters
  - fluids
  - general operation
  - hydraulics
  - oil cooler
  - oil reservoir
  - Pascal’s Law
  - pump
  - ram/cylinders, including single and multi-stage
  - safety considerations of fluids under pressure
  - seals
  - solenoid values
  - types of arrangements, including side acting, direct and suspended
- electric lifts – mechanics, including:
  - governor operation testing and rope tension testing
  - governor types, including vertical shaft, overspeed devices and horizontal shaft
  - governors
  - release procedures for each type of safety gear/governor combination

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    - safety gear types: A instantaneous, B flexible guide clamp, C wedge clamp and D oil buffer
- emergency release procedures - trapped passengers – WHS/OHS considerations and communication with passengers, including:
    - determining numbers and condition of passengers
    - direction of lift travel before stopping
    - emergency medical support
    - fault indication
    - hand winding
    - information related to impending movement and opening of doors
    - moving under power
    - passenger safety
    - reassurance as to safety of passengers
    - status of doors
    - warnings about standing near doors and using controls
- escalators and moving walks components, including:
    - balustrade lighting
    - controller
    - drive chain
    - handrail
    - handrail earthing
    - machine brakes
    - rollers and tension carriage
    - safety devices
    - step/pallet chains
    - steps/pallets/belts
    - track systems
    - truss
- geared types including rack and pinion and chain, including:
    - application
    - brakes
    - drum
    - efficiency
    - electric prime mover (motor types and control)
    - speed/load characteristics
- lift car, including:
    - access
    - buttons and indicators
    - communication devices
    - door operator

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  - frame
  - safety gear
  - superstructure
  - travelling cable
- lift components - electro-mechanical employing relay logic components, including:
  - acceleration circuits
  - button circuit
  - directional circuitry
  - door operator circuitry
  - fans
  - floor selector circuitry
  - indicator/lantern circuit
  - key switch circuits
  - mains supply
  - motor room control (selector)
  - power circuits
  - re-levelling circuitry
  - slowing and stopping circuitry
  - well control (transducer)
- lift components - electro-mechanical safety circuits, including:
  - car door locks
  - car top switch
  - car trap-door limit switch
  - circuit switches are all highlighted
  - emergency stop
  - fire service
  - landing door locks
  - pit switch
  - safety gear switch
  - tappet switch
  - terminal stopping
- lift components – electrical, including:
  - brushes
  - fuses
  - lamps
  - limit switches
  - motor/generator
  - relays: reverse phase and phase failure
  - selectors

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  - tachos
  - terminals
  - transformers
- lift components - electronic, including:
  - capacitors
  - electronic boards
  - encoders
  - input/output (I/O) board
  - processor board
  - rectifiers
  - resistors
  - selectors
  - transducers
- lift control circuits using relay logic, including:
  - acceleration, button, indicator/lantern, key switch and power circuits
  - directional, door operator, floor selector, re-levelling and slowing and stopping circuitry
  - fans
  - mains supply
  - motor room control (selector)
  - well control (transducer)
- lift electrical layout and special requirements, including:
  - colour coding and labelling
  - communication cabling
  - conduits
  - segregation low voltage (LV)/extra-low voltage (ELV)
  - special lift symbols
  - travelling cable
  - troughing
- lift machine room, including:
  - access
  - controller
  - floor selector
  - governor
  - machine
- lift pit, including:
  - access
  - buffers
  - compensators
  - safety equipment
- lift safety circuits, including:

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  - car door locks
  - car top switch
  - car trap-door limit switch
  - circuit breakers
  - circuit switches
  - door protection
  - emergency stop
  - fire service
  - governor/switch
  - landing door locks
  - limit switches
  - overloads
  - phase failure relay
  - pit switch
  - reverse phase relay
  - safety gear switch
  - tappet switch
  - terminal stopping
- lift systems - drive types, construction and operation of passenger, goods and service lifts, including:
  - drive constructions
  - drive types
  - emergency procedures
  - goods
  - passenger
  - rive operations
  - service
  - single and team manual handling
- lift well equipment, including:
  - counterweights
  - guide rails
  - landing doors and locks
  - limit switches/operating devices
  - ropes
  - roping systems
- maintenance, replacement and adjustment of mechanical lift components, including:
  - air cords
  - bearings: roller, sleeve, guide shoes and slipper
  - car doors
  - door guides

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  - landing doors
  - selectors
  - tapes/chains
- traction, including:
  - application
  - brakes
  - efficiency
  - electric prime mover (motor types and control)
  - speed/load characteristics
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- relevant technical industry standards, regulations, statutory requirements and codes for lifts systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0046 Find and repair faults in LV d.c. electrical apparatus and circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,500 volts (V) direct current (d.c.).

It includes working safely, finding faults in electrical apparatus, applying logical fault-finding workplace procedures, conducting repairs and completing the necessary service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

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UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to test and rectify faults	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS hazards are identified, risks assessed and control measures implemented in accordance with workplace procedures in preparation for work
	1.3 Scope of work to be undertaken is determined from fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are established in accordance with workplace procedures

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	1.6	Tools, equipment and testing devices needed to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and, as required, conducted within workplace safety procedures
	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from the fault or breakdown are assessed, documented on job safety assessments and risk control measures implemented in consultation with appropriate person/s
	2.5	Fault-finding analysis is approached methodically using measured and calculated values of electrical circuit/apparatus parameters
	2.6	Electrical circuit/apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.7	Faulty circuits/components are rechecked and fault status identified
	2.8	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of repair/s is tested in accordance with workplace procedures
	2.10	Electrical apparatus and circuits are inspected, reassembled, tested and prepared for return to service
	2.11	Unplanned situations are responded to safely in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.12	Fault-finding and repair activities are carried out without damage to apparatus circuits, the surrounding environment or services using sustainable energy practices

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3 Complete and document repair activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are tagged and despatched for repair to maintain adequate spares
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and repairing fault types in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,500 V d.c. must include at least five of the following:

- open circuit
- short circuit
- incorrect connections
- insulation failure
- unsafe condition
- apparatus/component failure
- related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG110A Find and repair faults in LV d.c. electrical apparatus and circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0046 Find and repair faults in LV d.c. electrical apparatus and circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using of risk control measures
- applying sustainable energy principles and practices
- completing repairs, and reporting fault-finding and repair activities
- finding and repairing faults in direct current (d.c.) electrical apparatus and circuits, including:
  - determining the likely extent of work from fault/breakdown reports and discussions with appropriate person/s
  - using methodical fault-finding techniques
  - finding faults efficiently
  - rectifying faults effectively
  - completing documentation correctly
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- implementing WHS/OHS requirements and workplace procedures
- preparing to find and rectify faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- d.c. motor control methods
- d.c. machines, including:
  - connection arrangements
  - installation and starting/running requirements and limitations
  - operating principles
  - purpose, types and applications

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    - typical fault symptoms and related conditions
- d.c. motor starters and their operating principles, including:
    - back emf
    - electronic controllers
    - series-lockout
    - timed starters
- power and control connection arrangements, including:
    - built-in stop/start control
    - interlocking with other starters and controls
    - overload protection
    - remote stop/start control
- braking methods, including:
    - dynamic
    - plugging
    - electromechanical
    - regenerative
- speed control methods, including:
    - field control
    - rheostatic control
    - voltage control
- protection of d.c. motors
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0047 Identify, shut down and restart systems with alternate supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify, shut down and restart systems with alternate supplies.

It includes identifying the system configuration, working safely with electricity generation systems and inverters, identifying hazards and controlling the associated risks, isolation and testing for de-energisation, reinstating the system after isolation, and completing relevant documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 **Prepare to work on systems with alternate supplies**	**1.1** Nature of the installation is obtained from appropriate written documentation, electrical drawings and/or relevant person/s to determine the scope of work
	1.2 WHS/OHS workplace procedures are obtained, interpreted and applied
	1.3 Hazards are identified, risks are assessed, and control measures are implemented
	1.4 Tools, equipment and circuit testing devices are obtained and checked for correct operation and safety in accordance with workplace procedures
	1.5 Work supervisor is consulted to ensure work is coordinated effectively with others
2 **Identify and isolate alternate supplies**	**2.1** Labelling indicating generation system/s connected on site is located, interpreted and checked against electrical diagrams
	2.2 Switchboard, circuits and known supply are identified
	2.3 Site procedures for isolation and shutdown are obtained and interpreted

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	2.4 Circuit to be isolated is identified and tested
	2.5 Shutdown procedures are completed in accordance with industry standards and workplace procedures
	2.6 Isolation of energy sources is completed and proved in accordance with workplace procedures, industry standards and regulatory requirements
	2.7 Systems are inspected and tested for compliance with industry and regulatory standards
	2.8 Battery storage system integrity is checked in accordance with industry standards and regulatory requirements
	2.9 System is re-instated after isolation
3 Complete work and document records	**3.1** WHS/OHS work completion risk control measures and procedures are followed
	3.2 Worksite is cleaned and made safe in accordance with workplace procedures
	3.3 Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures and regulatory requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Identifying, shutting down and restarting systems must include electricity generation systems and electricity converters relevant to the installation type, including:	• one with an energy source that is still available once turned off; and • one inverter energy system • AND, at least two of the following: • grid-connected inverter systems

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- photovoltaic (PV) array systems
- micro-inverters
- engine-driven generating sets
- stand-alone power systems
- battery systems

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0047 Identify, shut down and restart systems with alternate supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) workplace procedures
- identifying and assessing hazards and risks, including hazards based on supply system labelling, and implementing control measures
- obtaining and checking required tools, equipment and testing devices
- reading and interpreting electrical documentation, labelling and drawings
- identifying alternative supply arrangements and configurations
- applying safe shutdown procedures
- isolating energy sources in accordance with workplace procedures and regulatory requirements, including:
  - applying safe isolation practices
  - identifying correct isolation device
  - identifying and checking operation of control device/s
  - identifying live conductors
  - identifying known source of electromotive force (EMF) for testing purposes
  - correctly using a voltage tester
  - isolating multiple supplies, where required
  - isolating under no loads
  - ensuring all energy sources are isolated
  - de-energising charging sources, including:
    - solar charge controllers
    - battery chargers
  - proving systems are isolated
  - tagging-out all supplies
- ensuring all installation work complies with relevant industry standards and legislation to which the selection, installation and control equipment of each type of system must comply
- checking battery storage system integrity is in accordance with industry standards and regulatory and manufacturer requirements, including ventilation, correct isolation devices

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and installation position
- safely re-instating generation system to operational mode according to site documentation and manufacturer instructions
- completing required documentation and forwarding to relevant parties.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- working safely with alternate supplies, including identifying hazards and controlling risks in compliance with regulatory and enterprise requirements
- main types, arrangements and configurations of alternative supplies (generating system), including renewable and non-renewable generating systems
- fundamental requirements, including:
  - connection methods of alternative supplies
  - local supply authority requirements
  - characteristics and operation of uninterruptable power supplies (UPS)
  - direct current (d.c.) polarity requirements, including switching, correct rating of d.c. switches and protection devices
  - importance of replacing components like-for-like
  - inverter principles, including operation and interaction with the installation, anti-islanding and islanding requirements and testing requirements
  - identification and labelling requirements and their purpose
  - arrangement for connecting an alternative supply to an installation, including automatic and manual changeover switches, multiple main switches and switchboard wiring
  - earthing arrangements, including equipotential bonding, and earthing methods and requirements for stand-alone systems and generators
- safe isolation of the generator/energy source, including:
  - anti-islanding
  - auto changeover/auto start
  - backup – external power supply (EPS)/UPS mode or backup mode
  - earth fault alarm
  - voltage rise
  - voltage parameters AS/NZS 4777 Grid connection of energy systems via inverters
  - no loads
  - deenergising charging sources such as solar charge controllers, and battery chargers
  - AS/NZ 4836 Safe working on or near low-voltage electrical installations and equipment
- labelling and identification of alternate supply systems
- battery storage systems, including regulatory and manufacturer requirements
- relevant industry standards to which the selection, installation and control equipment of each type of system must comply, including:

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- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) relating to the requirements for electricity generation systems installation and electricity converters
- AS/NZS 4777(series) Grid connection of energy systems via inverters
- AS/NZS 5033 Installation and safety requirements for photovoltaic (PV) arrays
- AS/NZS 3010 Electrical installations - generating sets
- AS/NZS 4509 (series) Stand-alone power systems
- AS 3011 Electrical installations - Secondary batteries installed in buildings
- AS/NZS 5139 Electrical installations - Safety of battery systems for use with power conversion equipment

- site and regulatory documentation requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessors must also hold a current 'Unrestricted Electricians Licence' issued in an Australian state or territory to assess the units of competency relating to the Electrical Regulatory Authorities Council (or their successor) Essential Performance Capabilities for licensing and that require a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, manufacturer instructions, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0049 Install and maintain emergency safety systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and maintain fire and smoke control, emergency power supplies and early warning systems in buildings and premises.

It includes working safely to install and maintain emergency safety systems to relevant industry standards, complying with maintenance schedules and completing documentation.

Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevated work platforms (EWPs), powder-operated fixing tools, power-operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

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UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and maintain emergency safety systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, health and safety risks assessed and existing risk control measures and workplace procedures implemented
	1.3 Installation and/or maintenance is prepared in consultation with others affected by the work and sequenced appropriately

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	1.4	Nature and location of work is determined from workplace documentation or appropriate person/s to determine the scope of work
	1.5	Location of apparatus and associated equipment is planned within the constraints of the building structure, significants and regulations
	1.6	Advice is sought from appropriate person/s to ensure work is coordinated effectively with others
	1.7	Material for the installation work is obtained in accordance with workplace procedures and checked against job requirements
	1.8	Tools, equipment and testing devices needed for installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9	Preparatory work is checked to ensure no damage has occurred and complies with job specifications
2 Install and maintain emergency safety systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4	Apparatus and associated equipment are installed or maintained to comply with relevant industry technical standards, job specifications and requirements with sufficient access to enable terminations for adjustment and maintenance
	2.5	Wiring is terminated at apparatus and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
	2.6	Methods for dealing with unplanned situations are discussed with appropriate person/s, documented and acted upon in a manner that minimises risk to personnel and equipment

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	2.7	Ongoing checks of the quality of installed apparatus are undertaken in accordance with workplace procedures
	2.8	Apparatus installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
3 Complete and report on installation or maintenance activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final inspections and tests are made to ensure the installed or maintained apparatus conforms to job requirements
	3.4	'As-installed' emergency safety systems apparatus and associated equipment are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and maintaining emergency safety systems must include at least the following:	• fire and smoke control emergency safety systems • warning and evacuation safety systems • emergency power supplies

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG113A Install and maintain emergency safety systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0049 Install and maintain emergency safety systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting installation and maintenance activities
- installing electrical emergency safety systems
- maintaining electrical emergency safety systems, including:
  - determining the operating parameters of existing electrical safety systems
  - using established problem-solving methods
  - interpreting measured values appropriately
  - providing effective solutions to electrical safety system problems
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- preparing to install emergency safety systems
- preparing to maintain emergency safety systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- installing and maintaining electrical emergency safety systems, including:
  - cells and batteries in common use:
    - primary cells
    - secondary cells
    - discharging
    - recharging
    - terminal voltages

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    - capacity
    - discharge and recharge characteristics
    - battery configurations and applications
    - cell and battery safety practices
- electrical installations and emergency systems, including:
    - principles and practices of electrical emergency safety systems for electrical installations as contained in relevant Australian Standards, Building Code of Australian (BCA) and associated hazards documentation
    - arrangement and requirements for fire and smoke control equipment
    - arrangement and requirements for emergency warning and intercommunications systems
    - arrangement and requirement for emergency power supplies
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0050 Install and replace low voltage current transformer metering

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and replace of low voltage (LV) current transformer (CT) metering.

It includes preparing, installing and replacing LV CT metering. It also includes setting meter parameters and completing documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

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UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and replace LV CT metering	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS hazards are identified, risks are assessed, and control measures are implemented for work

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		preparation
	1.3	WHS/OHS hazards not previously identified are noted, risks assessed and risk control measures implemented
	1.4	Switchboard on which the meter/s and CTs are to be installed, inspected and tested are evaluated for compliance with safety and relevant industry standards
	1.5	Further work instructions for safety and/or functionality defects of the switchboard are sought from appropriate person/s in accordance with workplace procedures
	1.6	Installation of the meter, sequence and rectification work is prepared in consultation with relevant person/s
	1.7	Material needed for the work is obtained in accordance with workplace procedures and checked against work requirements
	1.8	Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Install and replace CT metering	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Existing metering is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Approved rectification work is carried out to comply with relevant industry standards and workplace procedures
	2.5	Meters and CTs are installed and replaced to comply with relevant industry standards and work specifications
	2.6	Metering power, functional requirements and communication connections, as required, are in accordance with manufacturer specifications and relevant industry standards
	2.7	Meter operating parameters and functional requirements are in accordance with manufacturer specifications and relevant industry standards

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	2.8	Unplanned situations are responded to in accordance with workplace procedures and with the approval of an authorised person in a manner that minimises risk to personnel and equipment
	2.9	Quality checks of the installed apparatus are undertaken in accordance with workplace procedures
	2.10	Metering and CT installation is carried out efficiently without unnecessary waste of materials, services, damage to apparatus, circuits or environment using sustainable energy principles
3 Complete and report metering installation activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation is accordance with workplace procedures
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Quality checks of the installed metering and CTs is in accordance with relevant industry standards
	3.4	Metering and CT work is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and replacing LV CT must include at least two of the following different installations:	• LV CT installation using single phase meters • LV CT installation using a polyphase meter • metering installation where compliance rectification work is required

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG076A Install and replace low voltage current transformer metering.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0050 Install and replace low voltage current transformer metering

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- inspecting and evaluating safety and functionality compliance of the switchboard accurately
- following established procedures to obtain approval to rectify non-compliance aspects of the switchboard
- carrying out preparation work effectively
- rectifying compliance defects
- placing and securing metering correctly
- making power and communications connections in accordance with manufacturer specifications and functional and regulatory requirements
- setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements
- reinstating supply to the installation safely
- documenting current transformer (CT) metering and rectification work and notifying appropriate persons in accordance with established procedures
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- completing activities
- following quality, workplace procedures and instructions
- preparing, installing and replacing CT energy metering
- selecting metering and CT components
- using tools, equipment, personal protective equipment (PPE) and testing devices
- reporting work activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- low voltage (LV) CT metering, including:
  - CTs encompassing:
    - uses and functions
    - AS 60044.1-2007 Instrument transformers - Current transformers, requirements
    - characteristics and saturation
    - differences between metering and protection CTs
    - standard ratios and outputs
    - accurate range of loading
    - thermal current limit
    - burden and connecting cable length
    - short circuiting secondary as a safety issue
    - accuracy class
  - revenue meter types used with CTs:
  - CT installations encompassing:
    - uses in the regulated market and relevant regulations
    - types and mounting methods
    - switchboard layouts (various distributors)
    - minimum spacing of CTs
    - connections to single and polyphase revenue meters
    - consequence of polarity reversal in one phase of a polyphase meter
- problem-solving techniques
- relevant industry standards
- relevant quality workplace procedures
- relevant tools, equipment and testing devices
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant sustainable energy practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in similar workplace operational situations where it is appropriate to do

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so; where this is not appropriate, assessment must occur in simulated similar workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0051 Investigate and report on electrical incidents and causes

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to investigate and report on electrical incidents and probable causes.

It includes investigating and reporting the possible electrical cause of incident/s resulting in electric shock, injury, fatality or property damage. It also includes working safely, gathering information from an incident site and from witnesses, conducting site tests, gathering and arranging for analysis of forensic evidence, documenting findings and presenting evidence in court.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

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UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to investigate electrical incident	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risks are identified and assessed, and risk control measures and workplace procedures implemented in preparation for electrical investigation
	1.3 Safety hazards not previously identified are noted on risk assessment, risk assessed and risk control measures

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		identified and implemented
	1.4	Notification of the electrical incident is reviewed in consultation with relevant person/s to establish the nature and extent of the electrical investigation
	1.5	Relevant person/s is consulted to ensure the investigation is coordinated effectively with others involved on the worksite
	1.6	Tools, equipment and testing devices needed for the electrical investigation are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Investigate electrical incident to determine cause	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out electrical investigation are followed
	2.2	Need to inspect, test or measure live electrical work is determined and conducted in accordance with WHS/OHS requirements and workplace procedures
	2.3	Cooperation of relevant person/s involved in the electrical investigation is sought and obtained
	2.4	Recreation of incident situation is undertaken and conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.5	Witnesses to the incident are interviewed in accordance with privacy principles, workplace procedures and protocols to determine the circumstances of the incident
	2.6	Physical evidence of probable causes of the electrical incident are identified by way of inspection and testing, and evidence is documented in accordance with workplace procedures
	2.7	Forensic evidence gathered at the incident site is handled to avoid contamination or damage, permission is obtained to remove evidence from the site, documentation is completed, as required, and evidence is forwarded to the relevant person/s for analysis
	2.8	Witness statements and evidence gathered at the site are documented in accordance with workplace procedures
	2.9	Actions are taken to prevent any unsafe electrical hazards found on the site from posing a risk of further

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		injury or damage in accordance with workplace procedures
3	**Report electrical investigation findings**	**3.1** Reports of forensic evidence analysis are obtained and reviewed for inclusion in the final investigation report
		3.2 Cause/s of electrical incident is extrapolated from the evidence using acceptable deductive methods
		3.3 Investigation procedures, finding, conclusions and recommendation are documented in accordance with workplace procedures
		3.4 Investigation report is forwarded to relevant person/s in accordance with workplace procedures and regulatory requirements
		3.5 Documented evidence in the investigation report is given in court, as required, honestly and without bias following court procedures and protocols

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Investigating and reporting on electrical incidents must include at least two of the following incidents:	• reported electric shock • injury from a reported electrical source • fatality from a reported electrical source • property damage from a reported electrical source
Electrical incident investigation must occur in at least one of the following:	• domestic premises • non-domestic premises • construction site
Electrical incident investigation witness statements must include the following:	• workplace procedures and results of inspections and tests undertaken on site • forensic evidence removed from site and for analysis

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- aspects of the electrical installation that do not comply with relevant safety, industry standards and requirements

Unit Mapping Information

This unit replaces but is not equivalent to UEENEEG172A Investigate and report on electrical incidents and causes.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0051 Investigate and report on electrical incidents and causes

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- recreating incident situation as accurately as evidence indicates
- interviewing and taking witness statements in accordance with workplace procedures
- gathering relevant physical evidence and treating it in accordance with workplace procedures
- documenting evidence gathered at the site, including:
  - aspects of the electrical installation that do not comply with safety standards and requirements
  - forensic evidence removed for analysis
  - written and photographic evidence
  - workplace procedures and results of tests undertaken
- documenting electrical investigation procedures, findings and conclusions appropriately
- reviewing scope and extent of the investigation from initial notification of the electrical incident
- taking appropriate actions to prevent any unsafe electrical hazards found on the site from posing a risk of any further injury or damage
- using deductive methods to determine the cause or causes of the electrical incident.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical incidents - investigation and reporting
- procedures and protocols for giving evidence in court encompassing:
  - process for responding to a witness summons
  - requirements for preparing to appear in court to give evidence
  - court procedures and protocols for giving evidence
- procedures and processes for responding to reported electrical incidents encompassing:

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    - reporting requirements of the electricity legislation for electrical accidents on customer's premises
    - responsibility for investigating electrical accidents on customer's premises
    - reporting procedures of electrical accidents on consumer's premises and distributor's assets
    - actions to be taken when an electrical incident causes loss of life, personal injury or property damage
    - initial task of an investigator of an electrical incident
    - extent of evidence needed to be gathered from the site of an electrical incident
- conditions and actions that could result in death, injury of property damage from an electrical cause encompassing:
    - non-compliance defects of an electrical installation
    - connection or use of unsuitable (not approved) electrical equipment and appliances
    - failure to follow safe working procedures
    - deliberate misuse
    - unacceptable rise in potential of exposed and extraneous conductive parts
- causes of rise in potential of exposed and extraneous conductive parts encompassing:
    - high impedance in the main or service neutral conductor of a multiple earthed neutral (MEN) system
    - earth faults
    - high impedance in the protective earthing under fault conditions
    - ineffective equipotential bonding under fault conditions
    - ineffective protective device under fault conditions
- effects and consequences of current through the human body
- electrical sources of fire in building and premises
- advanced electrical testing and measuring devices encompassing:
    - testing/measuring devices and their application
    - safe connection of testing/measuring devices into a circuit
    - taking readings
    - storage, maintenance and care of testing/measuring devices
- problem-solving techniques
- relevant industry standards
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment, resources and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions, including legal requirements for the removal of evidence from site.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0052 Maintain and service traction lift systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and service traction lift systems and equipment.

It includes planning, maintaining and servicing lift system and equipment by working safely; conducting site cleaning; lubricating and inspecting suspension, governors, compensators, floor selector and tappet switch ropes. It also includes carrying out periodic testing on lift safety gear, and completing and reporting service activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0045 Diagnose and rectify faults in traction lift systems

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare service lift equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of work to be undertaken is identified from maintenance workplace procedures or fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Tools, equipment and testing devices needed to carry out service work are obtained in accordance with

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		workplace procedures and checked for correct operation and safety
2 Service lift equipment	**2.1**	WHS/OHS risk control measures and procedures for carrying out service work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from fault/s or breakdown are documented on job safety assessments, risks assessed and risk control measures implemented in consultation with appropriate person/s
3 Complete and report service activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are inspected, tagged and despatched for repair to maintain adequate spares in accordance with workplace procedures
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining and servicing lift systems must include at least the following:	• two of the following lift equipment:
	  • geared traction drive
	  • gearless traction drive
	  • drum drive

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    - suspended electro-hydraulic drive
- two of the following roping systems:
    - single or double wrap
    - single or multiple fall
    - side slung or underslung
    - overhead or basement drive
    - drum drive
- two of the following components:
    - suspension ropes
    - governor ropes
    - tappet ropes
    - compensator ropes
    - floor selector tapes/ropes
- all of the following safety gear periodic tests:
    - governor type A
    - governor type B
    - governor type C

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG165A Maintain and service traction lifts systems and equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0052 Maintain and service traction lift systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting lift system servicing activities
- maintaining and servicing traction lift equipment, including:
  - carrying out lift safety gear periodic testing
  - conducting site cleaning and lubricating of lift equipment
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - inspecting lift ropes
  - maintaining electro-hydraulic lift equipment
- planning to maintain and service lift systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- lubricant selection for lift components, including:
  - cooling and viscosity
  - corrosion protection and friction reduction
  - lubricant loss and loss estimation
  - suitable oils, greases, coolants, rust preventatives and solvents for particular devices
- lubricant application for lift components, including hand grease guns, oil cans and misters, pressure and automatic lubricators, lubrication points, level indicators and estimating quantities
- lift systems: single and multiple wrap roping; types of ropes and their attachments, including

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hoisting, governor, tappet, compensator, selector, normal and Langs lay rope, standard ends attachments, splices, wedge sockets, Talurit fitting, Babbit sockets and Secon fitting
- lift system rope inspection, including:
  - corrosion, lubrication and tension
  - lift systems basic rope inspection
  - purpose
  - rope stretch
  - wear, broken strands, diameter and deformation
- rope stretch, including counterweight clearance and compensatory equipment
- inspection of rope attachments, including:
  - deformation and remedial action
  - rope anchor rods, castings and springs
  - wedges, swaging and checking for fracturing
- inspection of sheaves, including groove condition, rifling, ropes down in sheaves and maintenance records
- maintenance, replacement and adjustment of mechanical lift components, including:
  - air cords, selectors and tapes/chains
  - bearings: roller, sleeve, guide shoes and slipper
  - car and landing doors, locks and guides
  - well, pit and motor room equipment
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant requirements of lift code/enterprise
- relevant WHS/OHS legislated requirements
- relevant workplace documentation including authorisations permit parts/component, components fault report/s, despatch and store records, and test results
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining and servicing traction lifts
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0053 Maintain operation of electrical marine equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service electrical systems and equipment on maritime vessels and ships.

It includes working safely, planning to maintain marine electrical systems and equipment, applying logical fault diagnosis procedures, following fault rectification workplace procedures and maintaining the necessary operational documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

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UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain operation of electrical marine equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and understood
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of electrical work to be undertaken is determined from fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for the work are determined in accordance with workplace procedures

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	1.6	Tools, equipment and testing devices needed to locate fault/s are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Maintain operation of electrical marine equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Electrical circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from fault/s or breakdown are documented on job safety assessments, risks assessed and control measures implemented in consultation with appropriate person/s and workplace procedures
	2.5	Fault-finding analysis is approached methodically using measured and calculated values of electrical circuit/apparatus parameters
	2.6	Electrical circuit/apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.7	Faulty circuits/components are rechecked and fault status identified
	2.8	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of repair/s is tested in accordance with workplace procedures
	2.10	Electrical apparatus and circuits are inspected reassembled, tested and prepared for return to service
	2.11	Unplanned situations are responded to safely and in accordance with workplace procedures with the approval of an authorised person/s
	2.12	Fault-finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services using sustainable energy

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		practices
3 Complete work and report on operation of electrical marine equipment	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable faulty or worn components are tagged and despatched for repair in accordance with workplace procedures
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining operation of electrical marine equipment must include rectifying at least four of the following faults in marine equipment:

- open circuit
- short circuit
- incorrect connections
- insulation failure
- unsafe condition
- apparatus/component failure
- related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG119A Maintain operation of electrical marine equipment and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0053 Maintain operation of electrical marine equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing and reporting on maintaining operation of electrical marine equipment
- completing workplace documentation correctly
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining scope of work from fault/breakdown reports and discussions with appropriate person/s
- finding faults efficiently in accordance with workplace procedures and manufacturer specifications
- implementing WHS/OHS workplace procedures and practices
- maintaining operation of electrical marine equipment
- planning to maintain operation of electrical marine equipment
- rectifying faults effectively in accordance with workplace procedures and manufacturer specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- alternators, including construction, characteristics and synchronised operation
- apparatus, including:
  - switchboards/distribution boards
  - protective devices such as circuit breakers and earth leakage devices
  - control equipment

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    - socket outlets
    - electric vehicles
    - motor starters
    - associated control devices
- cells and batteries in common use, including:
    - battery configurations and applications
    - capacity
    - cell and battery safety practices
    - discharge and recharge characteristics
    - discharging
    - primary cells
    - recharging
    - secondary cells
    - terminal voltages
- circuits, including:
    - circuits supplying fix equipment
    - lighting
    - motors
    - socket outlets
    - trailing cable and within electric vehicles
- electrical system commissioning requirements and surveys
- marine electrical systems, including switchboards, instrumentation and earthing
- power supplies, including uninterruptible power supply (UPS) systems, batteries, maintenance and battery bank safety procedures
- purpose and types of lighting systems
- purpose, operating parameters and corrosion factors of cathodic protection
- safety equipment and codes and regulations
- switchboards and protection, including purpose, testing and maintenance and equipment removal
- sustainable energy principles and practices
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0054 Maintain operation of electrical mining equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service electrical systems and equipment in underground and open-cut mines.

It includes working safely, planning to maintain mining electrical systems and equipment, applying logical fault diagnosis procedures, following fault rectification workplace procedures and maintaining the service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

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UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain electrical mining equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for work are followed
	1.3 Scope of electrical work to be undertaken is determined from fault/breakdown reports and/or discussions with appropriate person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to locate faults are obtained in accordance with workplace

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		procedures and checked for correct operation and safety
2 Maintain operation of electrical mining equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from fault/s or breakdown are documented on job safety assessments, risks assessed and control measures implemented in consultation with appropriate person/s and workplace procedures
	2.5	Fault-finding analysis is approached methodically using measured and calculated values of electrical circuit/apparatus parameters
	2.6	Electrical circuit/apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.7	Faulty circuits/components are rechecked and fault status identified
	2.8	Materials/replacement parts required to rectify fault/s are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of repair/s is tested in accordance with workplace procedures
	2.10	Electrical apparatus and circuits are inspected, reassembled, tested and prepared for return to service
	2.11	Unplanned situations are responded to safely and in accordance with workplace procedures with the approval of an authorised person/s
	2.12	Fault-finding and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices

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3 Complete work and report on operation of electrical mining equipment	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are tagged and despatched for repair in accordance with workplace procedures
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

maintaining operation of electrical mining equipment must include rectifying at least four of the following faults in mining equipment and circuits:	• apparatus/component failure • incorrect connections • insulation failure • open circuit • related mechanical failure • short circuit • unsafe condition

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG118A Maintain operation of electrical mining equipment and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0054 Maintain operation of electrical mining equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying methodical fault-finding techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing and reporting maintaining operation of electrical mining equipment
- completing workplace documentation correctly
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining scope of work from fault/breakdown reports and discussion with appropriate person/s
- finding faults efficiently in accordance with workplace procedures and manufacturer specifications
- implementing WHS/OHS workplace procedures and practices
- maintaining operation of electrical mining equipment
- planning to maintain operation of electrical mining equipment
- rectifying faults effectively in accordance with workplace procedures and manufacturer specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical apparatus, including:
  - switchboards/distribution boards
  - protective devices such as circuit breakers
  - earth leakage devices
  - control equipment

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    - socket outlets
    - electric vehicles
    - motor starters and associated control devices
- electrical circuits, including:
    - supplying fix equipment
    - lighting
    - motors
    - socket outlets
    - trailing cable
    - within electric vehicles
- electrical control and protection in mines, including:
    - types of protection
    - operation of protection devices and systems
    - prospective fault currents
    - discrimination
- electrical mining systems, including:
    - earthing
    - mine reticulation
    - substations
    - switchgear
    - transmission lines
- environmental monitoring and control, including:
    - basic principles
    - control methods
    - types and application of sensors
- equipment monitoring methods
- fire detection, warning and control systems
- handling, storage and testing of mining cables
- operation and safety of mining equipment, including:
    - battery charging
    - battery-operated vehicles
    - conveyors
    - mine winder and package systems
    - ore extraction machinery
    - shuttle cars
    - ventilation fans
- relevant industry technical standards, regulations and codes for mining, including:
    - certified/approved electrical equipment
    - codes applicable to electrical safe working practices
    - installation arrangements

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  - installation of electrical equipment
  - protection for safety
  - regulations governing mining and related activities
  - standards mandated under regulation or by an authority, deemed-to-comply standard and local service requirements
  - testing and verification
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - component faults reports
  - inspection and test results
  - authorisations and permits
  - parts/component despatch and stores records
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0055 Overhaul and repair major switchgear and control gear

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to overhaul and repair switchgear and control gear rated in excess of 20 kiloamps (kA).

It includes planning and documenting the scope of service work required, arranging for the overhaul and repair to be carried out, verifying compliance of overhauled/repaired switchgear/control gear and completing the necessary service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for overhaul/repair of switchgear/control gear	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures and workplace procedures in preparation for work are followed
	1.3 Safety hazards that have not previously been identified are noted on job safety assessments, risks assessed and risk control measures implemented
	1.4 Workplace instructions on the scope of overhaul and/or repair work are received and expected outcomes of work discussed with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Switchgear/control gear service and repair documentation is read and applied
	1.7 Sources of materials required for work are determined in accordance with workplace procedures
	1.8 Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Overhaul switchgear/control gear	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out repair work are followed

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	2.2	Need to inspect, test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Switchgear and control gear are dismantled, parts tagged and stored to prevent loss or damage
	2.5	Serviceability of switchgear/control gear components is determined by measurement tests and inspections and results recorded in accordance with workplace procedures
	2.6	Materials/replacement parts required to complete repair work are sourced and obtained in accordance with workplace procedures
	2.7	Repairs are inspected and tested in accordance with workplace procedures
	2.8	Overhaul/repair specifications and work instructions are documented in accordance with workplace procedures
3 Document overhaul/repair work	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty or worn components are tagged and despatched for repair in accordance with workplace procedures
	3.3	Repair work is documented in accordance with workplace requirements, stating whether the switchgear/control gear complies with the overhaul specifications and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

overhauling and repair majoring switchgear and control gear must include at least two types of the following switchgear and control gear:

- low voltage (LV) switchgear and control gear rated above 20 kA
- any high voltage (HV) switchgear and control gear

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG129A Overhaul and repair major switchgear and controlgear.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0055 Overhaul and repair major switchgear and control gear

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- documenting overhaul/repair work
- overhauling and repairing major switchgear/control gear, including:
  - completing service documentation correctly
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining the state/serviceability of switchgear/control gear correctly
  - interpreting service and repair documentation correctly
  - repairing switchgear/control gear in accordance with relevant industry standards
- preparing for overhaul/repair of switchgear/control gear.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- types and applications of switchgear and control gear
- operating principles of switchgear and control gear
- interlocking systems, including:
  - external interlocking systems such as Castell key systems
  - internal interlocking systems for either safety or that operate in conjunction with Castell key systems
- control and protection of switchgear and control gear
- installation requirements, including:

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  - operating specifications for equipment
  - areas requiring repairs and maintenance
  - determining if repairs/maintenance are to be carried in situ or in workshop environment
  - relevant legislation and standards applicable to the installation
  - WHS/OHS issues with regard to removing/re-installing heavy equipment
  - electrical safety issues with regard to removing/re-installing equipment
  - understanding of CFC units
- electrical switchgear and control gear protection methods, including:
  - the operation of switchgear when it opens under load
  - the settings and operation required for both magnetic short circuit and thermal overload with equipment
  - determining the earth fault-loop impedance requirements required to keep touch voltage values within requirements
  - thermal imaging techniques
  - time/current curves from manufacturer specifications
  - equipment to safely test switchgear after repairs or maintenance
  - effectiveness of arc suppression installed within the equipment
  - modern types of switchgear that are computer controlled and programmed
  - modern types of switchgear that are interconnected to other protective devices
  - certification process for any repair or maintenance work performed
  - phase-failure systems
  - verifying the correct fault-level for the installation is consistent with the kiloamp (kA) rating of the equipment
  - x-ray and ultrasonic detection systems with regard to metallurgy
  - different types of lubricants required for different locations, temperatures and humidity
- electrical safe working practices of working safely on or around electrical equipment, including:
  - determining safe working standards and codes of practice for equipment and installations over 20 kA
  - WHS/OHS requirements for equipment and installations over 20 kA
  - working knowledge of operating within the vicinity of live conductors, such as barriers
  - procedures for working on switchgear over 20 kA
  - risks and control measures associated with harmful dusts and airborne contaminants, including thermal insulation, fibrous cement materials and asbestos, and other fibre-reinforced switchboard materials
  - checks and storage methods for maintaining the safety of testing devices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used reflect current industry practices in relation to overhauling and repairing major switchgear and control gear
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0056 Place and connect electrical coils

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to insulate, place and connect electrical coils in small armature/stators, transformers and solenoid equipped devices.

It includes working safely, using tools, placing and connecting conductors, following technical instructions and workplace procedures, and completing work reports.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0074 Wind electrical coils

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to place and connect electrical coils	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed
	1.3 Work instructions are identified, obtained and applied
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Materials required for the work are obtained in accordance with workplace routines and procedures
	1.6 Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Place and connect electrical coil	**2.1** Existing WHS/OHS risk control work measures are followed
	2.2 Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Coils and insulation are selected in accordance with work instructions and workplace procedures
	2.4 Insulation is cut and applied in accordance with work instructions and workplace procedures
	2.5 Coils are placed in accordance with work instructions and workplace procedures
	2.6 Coil ends are prepared and connections made in accordance with work instructions and workplace procedures
	2.7 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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	2.8	Routine quality checks are conducted to ensure electrical coils are correctly placed and connected in accordance with work instructions
	2.9	Electrical coil work is completed within timeframe, environment and workplace conditions
3 Complete workplace report	**3.1**	WHS/OHS work completion risk control measures are followed
	3.2	Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

placing and connecting coils must be completed in an environment designed specifically for the purpose and include at least two of the following:	• armatures • stators • transformers • solenoid equipped devices

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG151A Place and connect electrical coils.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0056 Place and connect electrical coils

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- placing and connecting electrical coils, including:
  - adhering to electrical coil quality workplace procedures
  - completing workplace report/forms accurately
  - connecting coils correctly
  - cutting insulation and placing insulation and coils without damage
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - following winding job specifications and instructions
  - preparing to place and connect coils
  - selecting correct coils and insulation
  - using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- winding wires, including:
  - dangers relating to handling
  - measuring wires using a gauge and micrometer
  - methods of application, including brush, spray, dip and trickle
  - types of varnish, including air drying, baking and epoxy
  - types of winding wires
  - winding wire varnishes, temperature ratings and removal methods

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- applications of winding wires, including:
  - armature windings
  - induction coils
  - solenoid
  - stator windings
  - transformer windings
- methods of winding wire connection, including:
  - conductor preparation
  - fusing, including advantages, join preparation and fusing process
  - hard soldering - silver soldering, including advantages, types of silver soldering, wire and flux, operation and safe working procedures with the oxy acetylene welding torch, join preparation, silver soldering process and inspection
  - soft soldering, including types of solder, soldering irons and tips, fluxes (purpose, types and dangers), soldering process and inspection
- insulation methods
- techniques in insulating coils for electrical static and rotating machines, including:
  - methods of insulating coils
  - precautions
  - types of insulation used
- coil types, including:
  - distributed D or mush shape coil group (three phase)
  - distributed concentric coil group (single phase/three phase)
  - distributed diamond shape coil group wound as individual coils (three phase)
  - distributed round end (three phase)
  - universal motor field coils (single phase)
- techniques in placing coils for electrical static and rotating machines, including:
  - coil finishing
  - connection for correct polarity
  - electrical testing
  - insertion into slots
  - manufacture for universal field coils
  - record data
  - taping (where applicable)
- electrical inspecting and testing regulations, industry standards and workplace procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to placing and connecting electrical coils
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0057 Plan electrical installations with a low voltage demand up to 400 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan electrical installation with a low voltage (LV) demand up to 400 ampere (A) per phase.

It includes planning, arranging and identifying resources for an electrical installation. It also includes arrangement of circuits; metering and control; cable route planning; specifying type and rating of switchgear, control gear, protection devices and wiring based on calculated and deemed-to-comply solutions and planning documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

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UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan electrical installation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) risk control measures and workplace procedures for carrying out work are followed
	1.2 Nature of the electrical installation is determined from job specifications
	1.3 Safety and regulatory requirements for electrical installation are identified, obtained and applied in accordance with relevant industry standards and safe work practices
	1.4 Electricity tariffs required are discussed with appropriate person/s to determine control and metering needs of the installation
2 Arrange installation circuits, control and metering	**2.1** Circuits are arranged to ensure safe and functional operation of the installation in accordance with relevant industry standards
	2.2 Circuits are arranged in accordance with relevant industry standards and job specifications
	2.3 Control and metering of the installation are arranged in accordance with relevant industry standards and job

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			specifications
		2.4	Earthing is arranged in accordance with relevant industry standards and energy supplier requirements
3	**Identify cables protection and switchgear**	**3.1**	Fault levels at relevant point/s of the installation are determined from calculations and/or information from the energy supplier
		3.2	Wiring systems selected are confirmed as meeting sustainable energy practices and job specifications
		3.3	Cable conductor sizes are confirmed to meet current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations and short circuit performance
		3.4	Protection methods and devices are identified to meet coordination requirements for overload and short circuit protection
		3.5	Switchgear and control gear are identified to meet fault levels, current voltage and ingress protection (IP) ratings and functional requirements
		3.6	Earthing system components are identified to meet requirements of the earthing system used
		3.7	Evidence is obtained that electrical equipment selected is in accordance with WHS/OHS and safe work practices
4	**Document electrical installation plan**	**4.1**	Equipment identified for the installation is documented with supporting calculations in accordance with workplace procedures
		4.2	Electrical installation is documented in accordance with workplace procedures and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning electrical installations with a LV demand up to 400 A per phase must include at least the following:	• a main switchboard current transformer (CT) metering • multiple tariffs or tenants • distribution boards - single • three phase final sub-circuits
Electrical installations must include at least the following:	• consumer mains • main earthing system and main switchboard and sub-mains • earthing system and distribution boards • final sub-circuits and requirement particular to the installation type

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG125A Plan electrical installations with a low voltage demand up to 400 A per phase.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0057 Plan electrical installations with a low voltage demand up to 400 A per phase

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- arranging electrical installations to comply with control, metering, safety and other regulatory and functional requirements
- specifying appropriate type and size of cables
- specifying protection methods and devices that meet coordination requirements for overload and short circuit protection
- specifying switchgear and control gear that meet fault level, current, voltage and ingress protection (IP) ratings and functional requirements
- selecting appropriate earthing system components
- documenting installation plan, specifications of equipment, equipment locations, cable routes and schedules and supporting calculations
- arranging electrical installations to comply with control, metering, safety and other regulatory and functional requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- following workplace procedures
- identifying cable protection and switchgear, including:
  - identifying protection methods and devices
  - identifying switchgear and control gear
- planning electrical installations, including applying job specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- low voltage (LV) electrical installations with demand of up to 400 ampere (A) per phase, including:

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  - electrical metering arrangements encompassing:
    - purpose, types and applications
    - metering equipment
    - arrangements for metering
- ingress protection rating
- relevant industry standards, including cable protection and switchgear
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0058 Plan large electrical projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan large electrical projects.

It includes preparing and developing project plans for approval. It also includes establishing budgets and critical path analysis; developing workflow strategies; and documenting, presenting and negotiating budgets and timelines.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to plan project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Project planning techniques are reviewed and adopted in accordance with workplace procedures

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		1.3	Scope of the project is identified from design brief specification and/or relevant documentation and from discussions with relevant person/s
2	**Develop project plan proposal**	**2.1**	Estimated plant, material, labour and related costs are sought from relevant person/s in accordance with workplace procedures
		2.2	Project budget is established from estimated plant, material, labour and related costs in accordance with workplace procedures
		2.3	Critical path analysis is applied to develop workflow strategies
		2.4	Sources and availability of materials and resources needed for the project are identified in accordance with workplace procedures
		2.5	Risk management strategies are sought and obtained for incorporating in the project plan
		2.6	Project plan is reviewed against all inputs and adjusted to rectify any anomalies
		2.7	Project plan proposal is documented in accordance with workplace procedures
3	**Obtain approval for project plan**	**3.1**	Project plan is presented and discussed with relevant person/s
		3.2	Alterations to the project plan resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final project plan is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG170A Plan large electrical projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0058 Plan large electrical projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- determining the project requirements accurately
- establishing a project budget
- developing effective workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan successfully
- obtaining approval of the final plan
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- identifying project scope and requirements, including plant, material, labour and related costs.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical project planning and analysing progress, including:
    - project planning encompassing:
        - purpose of project planning
    - defining project parameters encompassing:
        - project scope
        - project stakeholders and clients
        - project phases and the relationship between phases
        - time requirements and limitations
        - resource requirements and limitations
        - quality requirements and limitations
    - time-management concepts and standard practices
    - financial management encompassing:

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    - financial management concepts
    - standard practices for managing project finances
    - project budgets
    - costs
    - variations and estimations
    - invoicing against project phases/deliverables
    - acquittals
- quality management concepts and practices
- human resource management concepts and practices within a project
- communication management concepts and practices within a project
- risk management and contingencies encompassing:
    - risk management concepts
    - internal risks
    - external risks
    - contingencies
    - standard practices for managing risk within a project
    - risk minimisation
    - risk removal
- procurement management concepts and practices
- physical resource management concepts and practices relating to equipment, technology, information and facilities
- contracts encompassing:
    - contract format
    - contract content
    - interpreting contract clauses
    - legal obligations of contract parties
    - working to contract specifications
    - documentation accompanying contracts, such as schedules
- performance assessment and continuous improvement
- engineering ethics principles
- customer/client relations encompassing:
    - importance of customer/client relations
    - interpersonal skills that enhance customer/client relationships
    - dispute resolution
    - customer/client relations strategies
- electrical industry sector customs and practices encompassing:
    - equipment procurement, cost-benefit analysis and performance testing
    - typical approaches to planning and management
    - successful planning techniques
    - best practice management methods and styles

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    - documents needed to plan a project
    - factors influencing sequence and restraints of project activities
    - critical path analysis covering graphical representation methods and methods of representing time/rates
  - critical path and project analysis encompassing:
    - purpose of critical path analysis
    - essential data
    - relational sequence of work activities
    - graphical representation methods
    - methods of representing time/rates
    - monitoring methods
- relevant manufacturer specifications and operating instructions
- relevant plant, material, labour and related costs to project
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment and currently used in industry
- resources that reflect current industry practices in relation to planning electrical projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0059 Plan low voltage switchboard and control panel layouts

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan low voltage (LV) switchboard and control panel layout.

It includes preparing and planning the layout of electrical switchboards and control panel operating at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.) and fault levels not exceeding 20 kiloamps (kA) for approval.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

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or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to plan switchboard and control panel layout	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) risk control measures and workplace procedures for carrying out work activities are identified, obtained and applied
	1.2 Scope of switchboard and control panel layouts is determined from job specifications and/or design brief
	1.3 Switchboard and control panel layout safety and regulatory requirements are identified, obtained and applied in accordance with WHS/OHS requirements and relevant industry standards
	1.4 Equipment to be incorporated in the switchboard and control panel is determined from job specifications and/or design brief
2 Plan switchboard and control panel layout	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work activities are documented
	2.2 Equipment is selected in accordance with technical standards, job specifications and requirements
	2.3 Switchboard and control panel layouts are planned to accommodate equipment with sufficient clearance to enable wiring/connecting and servicing from job

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		specifications
	2.4	Switchboard and control panel layouts are planned in accordance with WHS/OHS and relevant industry standards
	2.5	Switchboard and control panel layout draft is checked with the design brief and in accordance with relevant industry standards
	2.6	Switchboard and control panel layout is documented for submission to appropriate person/s for acceptance and approval
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Obtain approval for switchboard and control panel layout	**3.1**	Requests for alterations to the layout are negotiated with appropriate person/s in accordance with workplace procedures
	3.2	Final layout design is documented and approval obtained from appropriate person/s
	3.3	Switchboard and control panel layout documentation is forwarded to appropriate person/s for production
	3.4	Quality of work is monitored in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Switchboard must be in more than one section and comprise essential and general supply controls, including:	• current transformer (CT) metering • sub-main controls • local distribution board • load monitoring

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Control panel must consist of controls for more than two electrical machines, electromechanical and/or electronic control devices, including:	• fault indication • relays • timers • logic controllers • indicators • switches/push buttons

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG128A Plan low voltage switchboard and control panel layouts.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0059 Plan low voltage switchboard and control panel layouts

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative layouts
- selecting equipment that complies with safety and functional requirements and budget limitations
- developing the layout within the safety and functional requirements and budget limitations
- successfully negotiating layout alteration requests
- obtaining approval for final layout design
- documenting layout and equipment specifications clearly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following quality procedures
- preparing and planning switchboard and control panel layouts.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- switchboard/control panel planning, including:
  - electrical metering arrangements encompassing:
    - purpose, types and applications
    - metering equipment
    - arrangements for metering
  - switchgear/control gear encompassing:
    - types and applications
    - operating principles
    - interlocking systems

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    - control and protection
    - installation requirements
  - control panel wiring encompassing:
    - equipment layout methods and accessories
    - connection identification methods
    - wiring techniques
- problem-solving techniques
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions for tools and equipment
- relevant tools, equipment, resources and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- relevant workplace quality procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0060 Prepare quotations for the supply of effective and efficient lighting products for lighting projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare quotations for supply of effective and efficient lighting products.

It includes identifying job specifications, and developing and submitting quotations to the customer.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0063 Provide photometric data for illumination system design

UEEEL0070 Select light sources and luminaries for given locations and designs

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify job specifications for quotation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures are

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			followed
		1.3	Scope of lighting products required is determined from job specifications and discussions with appropriate person/s
		1.4	Level of service quotation is determined from job specification, documented and agreement sought from appropriate person/s
		1.5	WHS/OHS policies and relevant industry standards are incorporated in work on which the quotation is based
		1.6	Timeline for the submission of the quotation is determined with the appropriate person/s
2	**Develop quotation**	**2.1**	Lighting products and related material take-off lists are prepared accurately and checked against job specification
		2.2	Lighting products are selected to meet job specification requirements
		2.3	Calculations are applied to selecting the type and quantity of lighting products included in the quotation
		2.4	Item costs are determined in accordance with workplace policy and procedures
		2.5	Quotations are checked for accuracy in costing and job specification
3	**Document and submit quotation**	**3.1**	Quotation is documented in accordance with workplace policies and procedures
		3.2	Quotation is submitted to customer by an agreed date

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Preparing quotation for the supply of lighting products with a quotation value in excess of $10,000 must include at least the following:

- three types of products:
  - luminaries type
  - high efficiency troffer fitting
  - high bay fittings
  - compact floodlamps
  - energy efficient halogen downlights
  - compact fluorescent downlights
  - diffused fluorescent fittings
- two types of installations:
  - large residential lighting design
  - store/shop lighting
  - shopping centre general lighting
  - security lighting
  - car park lighting

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG188A Prepare quotations for the supply of effective and efficient lighting products for lighting projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0060 Prepare quotations for the supply of effective and efficient lighting products for lighting projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two occasion and include:

- determining the scope of lighting products required from job specifications and discussions with customer and/or other appropriate person(s)
- documenting the compliance requirements and level of service on which the quotation is to be given
- establishing timelines for submission of the quotation
- performing material take-offs accurately
- applying calculation to selecting appropriate type and quantity of lighting products
- determining item costs from enterprise costing policy and procedures
- checking quotation against item costs and job specifications
- documenting quotation accurately and submitting it on time
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, includes using risk control measures
- developing quotations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- lighting products — quotation preparation, including:
  - knowledge of lighting products
  - illumination principles
  - lighting applications
  - lighting product parameters
  - compliance requirements

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  - installation conditions
  - interpreting manufacturer's technical data
  - interpreting job specifications
  - interpreting equipment schedules
  - documenting quotations
  - use of computer program for quoting purposes
- relevant item and service costing
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0061 Provide advice on the application of energy efficient lighting for ambient and aesthetic effect

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to advise customer on energy efficient lighting for ambient and aesthetic effects.

It includes identifying and providing lighting product advice on lighting principles, light source types, effects of colour and visual perception; interpreting manufacturer technical information and documenting advice.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0016 Provide advice on effective and energy efficient lighting products

UEEEL0022 Supply effective and efficient lighting products for domestic and small commercial applications

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify lighting products	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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		are identified and applied
	1.2	Appropriate questioning and active listening techniques are used to determine nature of lighting enquiry
	1.3	Lighting documentation/specifications that will assist in providing advice are reviewed
2 Provide advice on lighting products	**2.1**	WHS/OHS risk control measures are followed in accordance with workplace procedures
	2.2	Product knowledge of lighting colour rendering index (CRI) and creation of effects is applied to providing the necessary advice
	2.3	Technical or costing inquiries are referred to appropriate person/s, as required
	2.4	Inquiries and responses are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing accurate and clear advice on lighting must include at least three of the following:	• home theatre • hotel and club dining rooms • domestic entertainment areas • semi-covered alfresco dining area • lobby and gathering area • special requirements for a reception centre

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG183A Provide advice on the application of energy efficient lighting for ambient and aesthetic effect.

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Links

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Assessment Requirements for UEEEL0061 Provide advice on the application of energy efficient lighting for ambient and aesthetic effect

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying product knowledge of lighting effects, including determining the most appropriate advice
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- preparing and providing advice on the application of lighting for ambient and aesthetic effects, including:
  - referring technical and costing inquiries to appropriate person/s
  - responding to and documenting inquiries and responses
- using questioning techniques and active listening when dealing with customers.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- colour rendering index (CRI)
- control of lighting levels, including use of electrical or electronic and natural daylight
- customer communication skills and techniques
- diffused light
- effects of indirect and reflected light, including pelmet lighting
- effects of surface texture
- function of ambience
- lighting effects
- product knowledge of ambient and aesthetic lighting effects
- psychology of lighting, perception and mood, including colour, temperature and space and confinement
- relevant lighting workplace documentation

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- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements, including risk control measures
- relevant workplace policies and procedures
- visual perception.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0062 Provide engineering solutions to problems in complex polyphase power circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide engineering solutions to problems in complex polyphase power circuits at balanced and unbalanced conditions.

It includes working safely, applying problem-solving techniques, using electrical measuring devices, and providing solutions from measurements and calculations and justification for solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0036 Provide engineering solutions for problems in complex multiple path circuits

UEEEL0020 Solve problems in low voltage a.c. circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solutions in complex polyphase	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	power circuit problems		
		1.2	WHS/OHS risk control work preparation measures and workplace procedures are followed
		1.3	Scope of complex polyphase power circuit problems is identified from documentation and/or work instructions
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
		1.5	Sources of materials required for work are identified in accordance with workplace procedures
		1.6	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	**Provide engineering solutions to problems**	**2.1**	WHS/OHS risk control work measures and procedures are followed
		2.2	The need to test and measure live electrical work is determined in accordance with WHS/OHS requirements and workplace procedures
		2.3	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Complex polyphase power circuit problems are solved from interpreting measurements and calculated values in accordance with workplace procedures
		2.5	Unplanned situations are dealt with safely and with the approval of relevant person/s
		2.6	Problems are solved without damage to apparatus, circuits, the environment and/or services using sustainable energy practices
3	**Complete work and document solutions**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures
		3.3	Justification for solutions used to solve complex polyphase power circuit problems is documented
		3.4	Work completion is documented and relevant person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0062 Provide engineering solutions to problems in complex polyphase power circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- determining the operating parameters of existing circuit
- using established problem-solving methods
- taking relevant measurements accurately
- interpreting measured values appropriately
- providing effective solutions to circuit problems from measurements and calculations
- giving written justification of solutions provided
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- checking and isolating circuits
- documenting completed work and notifying relevant person/s
- identifying sources of materials required for work
- identifying the scope of the complex polyphase power circuit problems
- preparing for problems in complex polyphase power circuits
- testing and measuring live work
- using tools, equipment and testing equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- polyphase power circuit analysis, including:
  - polyphase supply system encompassing:
    - advantage of three phase system compared to single phase systems
    - double subscript notation
    - phase sequence
    - 120 degree operator
    - given circuit component parameters, solve practically-based problems using:

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    - equivalent circuits of transformers, lines and loads
    - component values using rectangular and polar notation
    - current divider and potential divider rules using complex impedances
    - the "per unit" values of voltage, current and impedance to a common VA base
- types of three phase system connections encompassing:
    - supply to balanced star, three and four wire loads
    - supply to delta connected loads
    - effects of phase reversal
    - representation of currents and voltages as complex phasors for three phase, and three phase and neutral quantities
    - calculation of the values of, and drawing labelled phasor diagrams, not to scale, to represent complex values of current and voltage for balanced and unbalanced loads for star and delta systems
    - calculation of values of P, Q and S for balanced and unbalanced systems
    - draw and label single phase diagrams to represent one phase of a complex three phase system
    - represent unbalanced voltages or currents as symmetrical components
    - phase-to-phase currents
    - phase-to-neutral/earth currents
- balanced three phase loads encompassing:
    - calculations of balanced loads connected in star
    - calculations of balanced loads connected in delta
    - calculation of steady state values of fault current for various configurations
    - evaluation of the symmetrical component impedances for the various distribution system components, transformers (earthed neutral case) and generators (high impedance earth)
    - calculation of fault currents using the per unit approach
    - calculation using the "worst case" values based on transformer impedance only (i.e. a short circuit fault)
    - estimation of peak values using accepted multipliers
    - effects of the direct current (d.c.) component on the instantaneous magnitudes of fault currents in transformers and generators
- unbalanced three phase loads encompassing:
    - star – four wire systems
    - delta systems
    - star – three wire systems
    - star - four wire with neutral impedance
- power in three phase circuits encompassing:
    - summation of phase powers and power in balanced loads
    - measurement of power in balanced loads – two Wattmeter methods
- reactive three phase power encompassing:

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    - power triangle calculation
    - measurement of VAR
    - power factor correction
  - fault currents encompassing:
    - symmetrical components
    - positive, negative and zero sequence impedance
    - fault current breaking and let-through energy capacities of circuit breakers and fuses
    - importance of fault/arc impedance
    - calculation of fault currents - phase-to-earth faults
    - calculation of fault currents - phase-to-phase faults
    - analysis of asymmetrical fault currents
  - harmonics in three phase systems encompassing:
    - presence of triple in harmonics in three phase systems
    - effects of three phase harmonics for different star and delta connections
    - methods for reducing harmonics in three phase systems
- problem-solving techniques
- relevant checks and isolation of circuits
- relevant manufacturer specifications and operating instructions
- relevant materials, tools, equipment and testing devices
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to providing engineering solutions for solving problems in complex polyphase power circuits

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0063 Provide photometric data for illumination system design

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide photometric data for illumination system design.

It includes preparing and providing photometric data, and documenting justification of the data.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to provide photometric data	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Illumination parameters of the design are obtained from a design brief, job specification and/or consultations

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		with the client
	1.3	Illumination parameters for particular situations and tasks are obtained and applied in accordance with relevant industry standards
	1.4	Lighting manufacturer specification for products are obtained and reviewed
2 Provide photometric data	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Photometric data is calculated for applications and variety of appropriate lighting products
	2.3	Data illumination is in accordance with relevant industry standards
	2.4	Data is documented in accordance with workplace procedures
	2.5	Photometric data documentation is forwarded to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing photometric data must include at least the following:	• determination of lighting levels for specific situations • interpretation of manufacturer photometric data • determination of lighting level transitions where safety is a consideration • calculations using the inverse square law • measurement of lighting levels using a light (lux) meter

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- presentation of a simple photometric report
- present a report (lighting levels) on an existing installation

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG184A Provide photometric data for illumination system design.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0063 Provide photometric data for illumination system design

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least three occasions and include:

- obtaining illumination parameters from a design brief, job specification or by consultation with the client
- understanding compliance and recommended illumination parameters for particular situations and tasks
- understanding manufacturers' technical information
- documenting photometric data, including justification for conclusions
- dealing with unplanned events
- applying industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures
- providing photometric data, including:
  - applying manufacturer specifications
  - calculating photometric data.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- photometric principles, vision and colour, including:
  - nature of light encompassing:
    - dual nature of light electromagnetic spectrum
    - frequency and wavelength (nm)
  - photometric principles and definitions encompassing:
    - scope and definitions from AS/NZS 1680.1 Interior and workplace lighting - General principles and recommendations, and AS ISO 1000 – 1998 The international system of units (SI) and its application

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    - luminous flux, definition and unit of measurement
    - luminous intensity, definition and International System of Units (SI) unit of measurement
    - radians and steradians
    - illuminance and luminance
    - basic optics, reflection and refraction
    - reflectance and transmittance
    - diffuse surfaces
    - the point source and the inverse square law
    - cosine law
    - relationship between watts and lumens
    - older imperial measurements (such as the footcandle or lumen per square foot and candlepower)
- physiology of the eye and light detection encompassing:
    - scotopic, mesopic and photopic vision
    - contrast sensitivity
    - colour vision – rods and cones
    - light levels and recognition of colour
    - adaptation
    - accommodation and visual acuity
    - brightness and lightness
    - image detection
    - glare and comfort
    - cognition and visual perception
- colour encompassing:
    - Munsell and CIE colour system
    - chromaticity coordinates
    - black body radiation and colour temperature
    - uniform chromaticity scale diagrams
    - factors determining colour appearance
- photometry encompassing:
    - the integrating sphere
    - distribution photometry
    - selected requirements of AS/NZS 1680.3 Interior and workplace lighting - Measurement, calculation and presentation of photometric data
    - the goniophotometer
    - measurement of luminous flux
    - measurement of luminance and cut-off angle
    - measurement of illuminance (single luminaire)
    - graphical representation of photometric data

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    - test reports and data presentation
    - lux meters and measuring equipment
    - required light levels for various situations in accordance with Australian/New Zealand Standards
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0064 Rewind HV three phase induction machines rated for voltages above 3.3 kV

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to rewind high voltage (HV) three phase induction machines rated for voltages above 3.3 kilovolt (kV).

It includes preparing and rewinding three phase induction machines rated voltage above 3.3 kV, applying technical and quality industry standards and keeping winding records.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0068 Rewind three phase low voltage induction machines

UEEEL0065 Rewind HV three phase induction machines rated for voltages to 3.3 kV

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to rewind three phase induction machines	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures for work preparation are followed
	1.3 Scope of work is determined in accordance with workplace procedures for work specifications and relevant industry standards
	1.4 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.5 Induction machine is dismantled, parts tagged and stored to prevent loss or damage
	1.6 Winding data is obtained from records or from measurements of stator and recorded in accordance with workplace procedures
	1.7 Winding is stripped from stator in accordance with workplace procedures
	1.8 Materials required for the work are obtained in accordance with workplace procedures
	1.9 Tools, equipment and testing devices required for work are obtained and checked for operation and safety
2 Rewind three phase induction machines	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Machines/equipment are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Stator is wound and insulated to 3.3 kV standards in

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		accordance with workplace procedures and relevant industry standards
	2.4	Machine is assembled and prepared for final testing in accordance with workplace procedures
	2.5	Problem-solving techniques are used to resolve unplanned events
	2.6	Quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape in accordance with workplace procedures and work instructions
	2.7	Work is completed in accordance with timeframe, environment and workplace procedures
3 Complete work report	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work report and forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Dismantling and winding stators must include at least two of the following:	• three phase induction machines rated for HV above 3.3 kV
Hazard and risk control measures must include at least the following:	• high voltage (HV) hazards • isolating machine/equipment for HV

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG156A Rewind HV three phase induction machines rated for voltages above 3.3 kV.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0064 Rewind HV three phase induction machines rated for voltages above 3.3 kV

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- dismantling machine and storing parts securely
- preparing stator for winding
- following winding specifications
- selecting correct coils and insulation
- winding and connecting stator correctly
- assembling machine and preparing for testing
- adhering to quality procedures
- completing work report/forms accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following quality procedures, workplace procedures and instructions
- rewinding three phase induction machines, including taking readings
- using tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- high voltage (HV) three phase motor winding techniques rated above 3.3 kilovolt (kV), including:
  - HV winding conductors and their applications
  - HV winding wire connection methods encompassing:
    - conductor handling
    - conductor preparation
    - connection mediums

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- insulation types and methods
- critical details and measurements when stripping a stator encompassing:
  - winding types:
    - hairpin wound stator and lap wound stator
  - winding diagram
  - wedges of a radially ventilated machine
  - factors to be considered when selecting cables for a stator
- procedures for checking the condition of a stripped stator in preparation for rewind encompassing:
  - manufacturer specifications
  - sequence of events between the removal of the old winding and the start of rewinding
  - core loss test, the effect this test may have on the core and expected test results
  - methods of overcoming hot spots in a stator core
  - level of insulation required to insulate the steel bracing rings that support the overhang
  - difference between the slot liners and packers of a 6.6 kV machine
- procedures for the fitting of coils to core, wedging and bracing encompassing:
  - significance of the slot portion of coils for machines above 3.3 kV
  - method of inserting the coils of a ribbon winding into slots
  - effects of undue mechanical stress on B stage insulated coils
  - importance of coil pitch and why it is important
  - sequence of events in fitting the first pole pitch group of coils in a lap winding
  - sequence of events in fitting the coils of a concentric winding
  - purpose and location of the excess packing in a slot
  - difference between the wedges for a lap and hairpin winding
  - method of fitting a wedge
  - difference that may be encountered between the wedges for a radial ventilated and the wedges for an axially ventilated machine
  - methods used to brace and strengthen the overhang of a lap winding and a hairpin winding
- procedures for making inter turn and inter coil connections on a hairpin winding and inter coil connections on a lap and bar winding encompassing:
  - sequence of events in making turn to turn connections, and insulating the turns of a lap winding:
    - connection methods, including silver solder or brazing and soft solder
  - sequence of events, from hand forming the coil to final insulation, in making the turn to turn connections in a hairpin winding, using a welded joint
  - sequence of events in making the coil to coil connections in a bar winding
- testing according to Australian, British and International Electrotechnical Commission (IEC) standards:
  - 6.6 kV B stage insulated winding and VPI winding test
- materials, procedures, tests and precautions required during and after the impregnation of

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completed windings according to Australian, British and IEC standards:
    - precautions to be taken when handling and using varnishes and resins
    - important features of an oven used to cure large impregnated machines
    - application and features of various impregnating materials:
        - water-based varnish, Xylol-based varnish and 100% solids resin
    - method of carrying out a gel test on a resin and a viscosity test on a varnish
    - typical quality procedures carried out on an impregnating varnish
    - procedure and precautions for carrying out a hot dip impregnation, a flood coat impregnation and a VPI impregnation
    - tests to be carried out after impregnation and bake on a 6.6 kV B stage insulated winding and a VPI winding
- winding to terminal connections according to Australian, British and IEC standards:
    - criteria for selection of winding to terminal cables:
        - voltage rating, full load current and fault capacity
    - common types of terminal boxes and their structure:
        - phase segregated, phase separated and phase insulated
    - method of making the joint between winding and terminal cables and insulating such a joint
- procedures and precautions to be followed when performing static electrical testing of a completed rewind according to Australian, British and IEC standards encompassing:
    - types and purpose of tests
    - testing safety precautions
    - testing procedures:
        - repetitive surge test, loss tangent test, polarisation index (PI) test, cold resistance test and polarity test
    - interpretation of test results
    - calculation of winding cold resistance and line and phase resistance
- relevant induction machines relevant industry standards
- relevant quality workplace procedures
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0065 Rewind HV three phase induction machines rated for voltages to 3.3 kV

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to rewind high voltage (HV) three phase induction machines rated for voltages to 3.3 kilovolt (kV).

It includes planning and rewinding three phase induction machines rated voltage to 3.3 kV.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0068 Rewind three phase low voltage induction machines

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to rewind three phase induction machines	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures for work preparation are followed
	1.3 Scope of work is determined in accordance with workplace procedures, job specifications and relevant industry standards
	1.4 Advice is sought from work supervisor to ensure work activity is coordinated effectively with others
	1.5 Induction machine is dismantled, parts tagged and stored to prevent loss or damage
	1.6 Winding data is obtained from records or measurements of stator and recorded in accordance with workplace procedures
	1.7 Winding is stripped from stator in accordance with workplace procedures
	1.8 Materials required for the work are obtained in accordance with workplace procedures
	1.9 Tools, equipment and testing devices required for work are obtained and checked for operation and safety
2 Rewind induction machines	**2.1** WHS/OHS risk control measures and workplace procedures are followed
	2.2 Machines/equipment are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Induction machine is dismantled, parts tagged and stored to prevent loss or damage
	2.4 Winding is stripped from stator in accordance with workplace procedures
	2.5 Stator is wound and insulated to 3.3 kV standards in

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		accordance with workplace procedures and relevant industry standards
	2.6	Machine is assembled and prepared for final testing in accordance with workplace procedures
	2.7	Methods for dealing with unplanned events are in accordance with workplace procedures
	2.8	Quality checks are conducted to ensure coils are correctly wound with correct wire number of turns and shape in accordance with workplace procedures and work instructions
	2.9	Work is completed in accordance with timeframes, environment and workplace procedures
3 Complete work report	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work report and forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Dismantling and winding stators must include at least two of the following:	• three phase induction machines for HV to 3.3 kV
Hazard and risk control measure must include at least the following:	• HV hazards • isolating machine/equipment for HV

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG155A Rewind HV three phase induction machines rated for voltages to 3.3 kV.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0065 Rewind HV three phase induction machines rated for voltages to 3.3 kV

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- dismantling machine and storing parts securely
- preparing stator for winding
- following winding specifications
- selecting correct coils and insulation
- winding and connecting stator correctly
- assembling machine and preparing for testing
- adhering to quality procedures
- completing work report/forms accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following quality procedures, workplace procedures and instructions
- rewinding three phase induction machines.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- high voltage (HV) three phase motor winding techniques rated to 3.3 kilovolt (kV), including:
  - HV winding conductors and their applications
  - HV winding wire connection methods encompassing:
    - conductor handling
    - conductor preparation
    - connection mediums
  - insulation types and methods

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- critical details and measurements when stripping a stator encompassing:
  - winding types:
    - hairpin wound stator and lap wound stator
  - winding diagram
  - wedges of a radially ventilated machine
  - factors to be considered when selecting cables for a stator
- procedures for checking the condition of a stripped stator in preparation for rewind encompassing:
  - manufacturer specifications
  - sequence of events between the removal of the old winding and the start of rewinding
  - core loss test, the effect this test may have on the core and expected test results
  - methods of overcoming hot spots in a stator core
  - level of insulation required to insulate the steel bracing rings that support the overhang
  - difference between the slot liners and packers of a 3.3 kV machine
- procedures for the fitting of coils to core, wedging and bracing encompassing:
  - significance of the slot portion of coils for machines
  - method of inserting the coils of a ribbon winding into slots
  - effects of undue mechanical stress on B stage insulated coils
  - importance of coil pitch
  - sequence of events in fitting the first pole pitch group of coils in a lap winding
  - sequence of events in fitting the coils of a concentric winding
  - purpose and location of the excess packing in a slot
  - difference between the wedges for a lap and hairpin winding
  - method of fitting a wedge
  - difference that may be encountered between the wedges for a radial ventilated and the wedges for an axially ventilated machine
  - methods used to brace and strengthen the overhang of a lap winding and a hairpin winding
- procedures for making inter-turn and inter-coil connections on a hairpin winding and inter-coil connections on a lap and bar winding encompassing:
  - sequence of events in making turn to turn connections, and insulating the turns of a lap winding:
    - connection methods, including silver solder or brazing and soft solder
  - sequence of events, from hand forming the coil to final insulation, in making the turn to turn connections in a hairpin winding using a welded joint
  - sequence of events in making the coil to coil connections in a bar winding
- testing according to Australian, British and International Electrotechnical Commission (IEC) standards:
  - 3.3 kV B stage insulated winding test and VPI winding test
- materials, procedures, tests and precautions required during and after the impregnation of completed windings according to Australian, British and IEC standards:

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- precautions to be taken when handling and using varnishes and resins
- important features of an oven used to cure large impregnated machines
- application and features of various impregnating materials:
  - water-based varnish, Xylol-based varnish and 100% solids resin
- method of carrying out a gel test on a resin and a viscosity test on a varnish
- typical quality procedures carried out on an impregnating varnish
- procedure and precautions for carrying out a hot dip impregnation, a flood coat impregnation and a VPI impregnation
- tests to be carried out after impregnation and bake on a 3.3 kV B stage insulated winding and a VPI winding

- winding to terminal connections according to British and IEC standards:
  - criteria for selection of winding to terminal cables:
    - voltage rating, full load current and fault capacity
  - common types of terminal boxes and their structure:
    - phase segregated, phase separated and phase insulated
  - method of making the joint between winding and terminal cables and insulating such a joint
- procedures and precautions to be followed when performing static electrical testing of a completed rewind according to Australian, British and IEC standards encompassing:
  - types and purpose of tests
  - testing safety precautions
  - testing procedures:
    - repetitive surge test, loss tangent test, polarisation index (PI) test, cold resistance test and polarity test
  - interpretation of test results
  - calculation of winding cold resistance and line and phase resistance
- problem-solving techniques
- relevant industry standards
- relevant quality workplace procedures
- relevant safe work method statements (SWMS) /job safety assessments or risk mitigation processes
- relevant tools, equipment and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0066 Rewind LV direct current machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare, place and connect coils and insulating in direct current (d.c.) motor armatures and poles.

It includes preparing to and rewinding d.c. machines by working safely, using tools, measuring and stator windings. It also includes applying technical and quality industry standards and completing workplace reports and winding records.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Electrical

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to rewind d.c. machine	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed
	1.3 Scope of work is determined from job specifications and regulatory requirements
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with workplace procedures
	1.6 Materials required for the work are obtained in accordance with workplace procedures and job specification
	1.7 Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Rewind d.c. machine	**2.1** Existing WHS/OHS risk control work measures are followed
	2.2 Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage in accordance with workplace procedures and instructions
	2.4 Winding is stripped from stator in accordance with

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		workplace procedures
	2.5	Armature and fields are wound and insulated in accordance with winding data, job specifications and workplace procedures
	2.6	Machine is assembled and prepared for inspection and testing in accordance with workplace procedures
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Routine quality checks are conducted to ensure coils are correctly wound, with correct wire, number of turns and shape in accordance with workplace procedures and job specifications
	2.9	Electrical coil work is completed in timeframe, environment and workplace conditions
3 Complete workplace reports	**3.1**	WHS/OHS work completion risk control measures are followed
	3.2	Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Dismantling and winding armatures and field coils must include the following:	• three different d.c. machines in an environment designed specifically for the purpose

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG154A Rewind LV direct current machines.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0066 Rewind LV direct current machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace reports and documentation
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- inspecting and testing of completed machine work
- planning to rewind low voltage (LV) direct current (d.c.) machines
- rewinding d.c. machines rated for LV, including:
  - adhering to quality workplace procedures
  - assembling machine and preparing for testing
  - completing workplace reports/forms accurately
  - dismantling machine and storing parts securely
  - following winding specifications
  - preparing stator for winding
  - selecting correct coils and insulation
  - winding and connecting armature and fields correctly
  - checking dimensions
- using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commutation and interpoles, including:
  - conditions for sparkless commutation and methods used to reduce sparking

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  - interpoles or commutating poles
  - principles of commutation and advantages of interpoles
  - resistance and electromagnetic field commutation
- current industry practices and technologies
- d.c. motor winding techniques
- calculations and insulation specifications, including:
  - calculation of a half coil length and the amount of copper required
  - commutators and identification of insulation specifications
  - preparation of coils and equalisers
  - preparation of copper prior to insulating coils and equalisers on armatures
- commutation and interpoles
- critical details and measurements when stripping a stator of a d.c. machine, including:
  - lap winding with equalisers
  - types of windings
  - wave winding
  - winding layout
- d.c. armature windings, including:
  - lap and wave windings, progressive and retrogressive windings
  - terms
- preparation for rewinding, including:
  - checking the condition of a stripped core
  - core loss test
  - hot spots in armature core
  - testing commutator before use
  - removing of old winding
- principles and construction, including:
  - construction of d.c. machine
  - d.c. machine types
  - types of armature windings, including parallel circuits
  - value of generated electromagnetic field
- procedures and precautions required when inspecting, testing and/or re-using a commutator, including:
  - coil position and commutator segment relationship
  - commutator wear ring
  - removal of armature leads on tungsten inert gas (TIG) welded commutator
  - TIG welded and soft soldered commutators
- selection of appropriate insulation, including:
  - B stage and VPI insulation
  - dielectric strength, temperature rating,
  - insulation properties, method of application and specific uses

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  - insulations used on the slot portion and overhang
  - manufacturer recommendations
  - reason for selecting a particular insulation
- simplex armature lap windings and wave windings, including:
  - characteristics and applications
  - commutator pitch
  - number and position of brushes
- electrical power systems LV
- identification of insulation specifications
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- simplex lap windings, including equalising connections for armature windings
- simplex wave windings, including dummy coils, comparison of lap and wave windings, and armature winding calculations
- sustainable energy principles and practices
- testing techniques, including continuity, insulation testing, use of ‘growler’ and magnetic field testing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to rewinding LV d.c. machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0067 Rewind single phase machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to dismantle and wind stators for single phase machines.

It includes planning to and rewinding single phase machines by working safely, using tools, measuring and winding data. It also includes following technical instructions/specifications, workplace procedures and recording workplace activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to rewind single phase machines	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed
	1.3 Work instructions are identified, obtained and applied
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Winding data is obtained from records or work supervisor in accordance with workplace procedures
	1.6 Materials required for work are obtained in accordance with technical specifications and workplace procedures
	1.7 Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Rewind single phase machines	**2.1** Existing WHS/OHS risk control work measures are followed
	2.2 Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Single phase machine is dismantled and parts tagged and stored to prevent loss or damage in accordance with workplace procedures and instructions

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	2.4	Winding is stripped from stator in accordance with workplace procedure and instructions
	2.5	Stator is wound and insulated in accordance with winding data and workplace procedures
	2.6	Machine is assembled and prepared for inspection and testing in accordance with workplace procedures
	2.7	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8	Routine quality checks are conducted to ensure electrical coils are correctly wound with correct wire, number of turns and shape in accordance with work instructions and technical specifications
	2.9	Rewind stators work is completed within timeframe, environment and workplace conditions
3 Complete workplace report	**3.1**	WHS/OHS workplace completion risk control measures are followed
	3.2	Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Rewinding single phase machines must include the following:	• dismantling and winding stators for single phase machines in an environment designed specifically for the purpose

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG152A Rewind single phase machines.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0067 Rewind single phase machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing work reports
- planning to dismantle and wind stators for single phase machines
- rewinding single phase induction machines, including:
  - adhering to quality workplace procedures
  - assembling machine and preparing for inspection and testing
  - completing workplace report/forms accurately
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - dismantling machine and storing parts securely
  - following winding specifications and/or instructions
  - preparing stator for winding
  - selecting correct coils and insulation
  - winding and connecting stator correctly
- using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures
- safe working practices and rewinding single phase machines
- sustainable energy principles and practices
- techniques of winding single phase machines, including:
  - electrical machine insulation types and applications
  - coil placement techniques
  - coil connection arrangements and terminations
  - winding insulation methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to rewinding single phase machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0068 Rewind three phase low voltage induction machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare, place and connect coils and insulation in three phase stators and rotors in low voltage (LV) induction machine.

It includes preparing to and rewinding three phase induction machines by working safely, using tools, measuring and stator windings. It also includes applying technical and quality industry standards and completing workplace reports and winding records.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to rewind three phase induction machines	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Existing WHS/OHS risk control measures for work preparation are followed
	1.3 Scope of work is determined from job specifications and regulatory requirements
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with workplace procedures
	1.6 Materials required for the work are obtained in accordance with workplace procedures and job specifications
	1.7 Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
2 Rewind three phase induction machine	**2.1** Existing WHS/OHS risk control work measures are followed
	2.2 Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures

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	2.3 Induction machine is dismantled and parts tagged and stored to prevent loss or damage in accordance with workplace procedures and instructions
	2.4 Winding is stripped from stator in accordance with workplace procedures
	2.5 Stator is wound and insulated in accordance with winding data, job specifications and workplace procedures
	2.6 Machine is assembled and prepared for inspection and testing in accordance with workplace procedures
	2.7 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.8 Routine quality checks are conducted to ensure coils are correctly wound, with correct wire, number of turns and shape in accordance with workplace procedures and job specifications
	2.9 Electrical coil work is completed within timeframe, environment and workplace conditions
3 Complete workplace report	**3.1** WHS/OHS work completion risk control measures are followed
	3.2 Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Dismantling and winding stators must include the following:	• three different three phase induction machines in an environment designed specifically for the purpose

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEG153A Rewind three phase low voltage induction machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0068 Rewind three phase low voltage induction machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace reports and forms
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- inspecting and testing completed induction machine work
- planning to rewind three phase induction machines
- rewinding three phase induction machines rated for low voltage (LV), including:
  - adhering to quality workplace procedures
  - assembling machine and preparing for inspection and testing
  - completing workplace report/forms accurately
  - dismantling machine and storing parts securely
  - following winding specifications and/or instructions
  - preparing stator for winding
  - selecting correct coils and insulation
  - winding and connecting stator correctly
- using tools safely in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- three phase windings, including:
  - chain, lap and wave windings
  - concentrated and distributed windings

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  - half-coil and whole-coil windings
  - half-coil winding for a three phase alternator
  - pole-pitch and coil-span
  - three phase stator winding
  - whole-coil stator winding for a three phase alternator
- rating and cooling of alternators and the voltage regulator
- techniques of winding three phase motors, including:
  - coil connection arrangements and terminations
  - coil placement techniques
  - electrical machine insulation types and applications
  - winding insulation methods
- testing techniques, including continuity, insulation testing, use of ‘growler’ and magnetic field testing
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to rewinding three phase induction machines rated for LV
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0069 Select and arrange equipment for special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select and arrange electrical equipment into distribution circuits for installations associated with construction and demolition sites, transportable structures and vehicles, including their site supplies, marinas, electromedical treatment areas (patient areas), and shows and carnivals operating up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes arranging the installation for correct functioning and safe connection to supply by the selection of switchgear, control gear, protection devices and wiring based on calculated and deemed-to-comply solutions. It also includes completing electrical installation documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0019 Solve problems in direct current (d.c.) machines

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UEEEL0021 Solve problems in electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to select equipment	**1.1** Scope and nature of the electrical installation is determined from job specifications
	1.2 Safety and relevant regulatory electrical installation requirements are identified and applied
2 Arrange installation into circuits	**2.1** Circuits are arranged to ensure safe and functional operation of the installation
	2.2 Circuits are arranged to comply with applicable technical industry standards and job specification requirements
	2.3 Earthing is arranged to comply with the multiple earthed

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		neutral (MEN) system requirements
3 Select cables, protection and switchgear	**3.1**	Wiring is selected for suitability for the environments in which they are installed
	3.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations
	3.3	Protection methods and devices are selected to meet coordination requirements for overload and short circuit protection
	3.4	Switchgear and control gear are selected to meet current, voltage and ingress protection (IP) ratings and functional requirements
	3.5	Earthing system components are selected to meet requirements of the MEN system
	3.6	Evidence is obtained that electrical equipment selected complies with safety requirements
4 Document electrical installation	**4.1**	Electrical installation equipment selections and calculations are documented in accordance with workplace procedures
	4.2	Electrical installation arrangement and specifications for items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting and arranging low voltage (LV) electrical equipment must include at least two of the following types of special installations:	• caravan parks • construction and demolition sites • marinas • medical treatment areas

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Special LV electrical installations must include the following:	• moveable premises • shows and carnivals • consumer mains • main earthing system and main switchboard • sub-mains • earthing system and distribution boards • final sub-circuits and requirements particular to the installation type

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG120A Select and arrange equipment for special LV electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0069 Select and arrange equipment for special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- selecting and arranging equipment for special electrical installations, including:
  - arranging special electrical installations to comply with safety, other regulatory and functional requirements, technical industry standards and job specifications
  - documenting installation arrangements, specifications for items selected and reasons for the selections made
  - selecting appropriate earthing components that meet multiple earthed neutral (MEN) system requirements in special installations
  - selecting appropriate type and size of cables that are suitable for the environment requirements and meet current-carrying capacity, voltage-drop and fault-loop impedance requirements
  - selecting protection methods and devices that meet coordination requirements for overload and short circuit protection
  - selecting switchgear and control gear that meet current, voltage and ingress protection (IP) ratings and functional requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant workplace documentation

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- relevant workplace policies and procedures
- technical industry standards, regulations and codes for special electrical installations, including:
  - scope of relevant industry standards for special installations, including additional industry standard wiring rules requirements
  - transportable structures and vehicles, including their site supplies
  - construction and demolition sites
  - marinas
  - electromedical treatment areas (patient areas)
  - shows and carnivals
- awareness of high voltage (HV) consumer installations standards.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0070 Select effective and efficient light sources and luminaries for given locations and designs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select effective and efficient light sources and luminaries for given locations and designs.

It includes preparing and selecting light sources and luminaries, and documenting justification for the selections.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0063 Provide photometric data for illumination system design

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to select light sources and luminaries	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work location are identified and applied
	1.2 Lighting design parameters are obtained from a design brief, job specification and/or consultations with the

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		client
	1.3	Illumination parameters for particular situation and task are obtained and applied in accordance with relevant industry standards
	1.4	Lighting manufacturer specifications for products are obtained and reviewed
2 Select light sources and luminaries	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Light sources and luminaries are selected appropriate to lighting design parameters
	2.3	Selected light sources and luminaries are within the illumination in accordance with relevant industry standards and the job specification
	2.4	Selected light sources and luminaries are documented accordance with workplace procedures
	2.5	Documentation is forwarded to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting light sources and luminaries must be demonstrated in at least three of the following:

- an application using incandescent lamps for colour rendition
- outside security lighting
- high bay application
- highway lighting
- store/shop lighting
- school or training classroom
- localised task lighting
- flood-lighting application

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- situation integrating some natural daylight

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG185A Select effective and efficient light sources and luminaries for given locations and designs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0070 Select effective and efficient light sources and luminaries for given locations and designs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- obtaining illumination parameters from a design brief, job specification or by consultation with the client
- understanding compliance and recommended illumination parameters for particular situations and tasks
- understanding manufacturers' technical information
- selecting appropriate light sources and luminaries
- documenting selected light sources and luminaries, including justification for the selections made
- dealing with unplanned events
- applying industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following workplace procedures
- applying manufacturer specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- light sources, lamps and luminaries, including:
  - types of light sources and their historic development, including the practical requirements, advantages and disadvantages encompassing:
    - incandescent
    - electrical discharge in gases
    - tubular fluorescent
    - compact fluorescent types

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    - phosphor types
    - low pressure sodium
    - high pressure sodium
    - metal halide
    - mercury vapour
    - tungsten halogen cycle lamps
    - neon and advertising tube types
    - light-emitting diode (LED) technologies
  - each practical lamp type is designated in terms encompassing:
    - luminous efficacy
    - spectral output
    - colour rendering
    - longevity of operation
    - supply requirements and control equipment
    - cost
    - sustainability and recycling
  - types of luminaries encompassing:
    - general design and types
    - provision of data on luminaries
    - methods of light control
    - properties of optical systems: refractors, reflectors and diffusers
    - luminance control techniques
    - luminaires and auxiliaries
    - Australian Standards for indoor and outdoor luminaries
    - calculation of utilisation factors
    - provision of photometric data
    - luminance of various fittings
  - natural lighting and building design
  - techniques used to minimise energy expenditure
  - specific application lamps:
    - specific task lamps
    - germicidal lamps
    - indoor agricultural or hydroponic lamps
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0071 Select low voltage power factor correction equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select low voltage (LV) power factor correction equipment.

It includes preparing and selecting (sizing) power factor correction equipment for commercial and/or industrial installations and documenting the selection of the equipment.

The correction equipment is limited to the capacitive type, including control devices/systems, including contactors or solid-state types.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for general electrical installations

UEEEL0005 Develop and connect electrical control circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

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UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS		PERFORMANCE CRITERIA	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	**Prepare to select power factor correction equipment**	**1.1**	Scope of the electrical installation is determined from job specifications and/or appropriate person/s
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) electrical installation requirements and relevant industry standards are identified and applied
		1.3	Cable routes, route lengths of cables and conditions of the wiring system for operation are determined from job specifications and/or appropriate person/s
2	**Select power factor correction equipment**	**2.1**	Wiring systems are selected for suitability of the environments
		2.2	Cable conductor sizes are selected for current-carrying capacity requirements, voltage-drop and earth fault-loop

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		impedance limitations
	2.3	Circuit protective devices are selected to meet job specifications for coordination with conductor current-carrying capacity
	2.4	Earthing system components are selected for the multiple earth neutral (MEN) system
	2.5	Evidence of the electrical equipment selected is obtained in accordance with WHS/OHS safety requirements
3 Complete documentation	**3.1**	Evidence from manufacturer/supplier of the selected electrical equipment is obtained in accordance with WHS/OHS safety requirements
	3.2	Selection justification and calculations are documented in accordance with workplace procedures
	3.3	Electrical installation arrangement and manufacturer specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting power factor correction equipment must include at least two different power factor installations from the following:	• LV installation using contactor switching • LV installation using solid-state switching • high voltage (HV) installation using contactor switching • HV installation using solid-state switching

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG177A Select low voltage power factor correction equipment.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0071 Select low voltage power factor correction equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent and nature of the installation from job specifications
- obtaining and understanding the safety and other regulatory requirements to which the electrical installation shall comply
- determining power factor correction equipment using graphical or mathematical methods
- selecting wiring system suitable for the environment requirements
- selecting cable conductor sizes in consideration to current-carrying capacity and voltage-drop/earth fault-loop limitation
- ensuring coordination between circuit protective device and conductor current-carrying capacity
- selecting compliant earthing system components
- documenting equipment and systems requirements to be used, specification for items selected and reasons for the selections made
- dealing with unplanned events
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- documenting power factor correction equipment installation details
- following workplace procedures
- performing relevant industry calculations
- selecting power factor correction equipment, including:
  - obtaining and applying safety and relevant industry standards
  - selecting power factor correction equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- power factor correction — equipment selection, including:
  - definitions, concept of power factor and reasons for improving power factor
  - situations leading to reduction of power factor
  - consequences of poor power factor encompassing:
    - demand tariff costs
    - non-compliance with national service provider (NSP) and system energy loss
  - design considerations encompassing:
    - special conditions existing and the suitability for power factor correction (PFC) such as existence of distortion due to electronic loads, uninterruptable power supply (UPS) systems, and power generation facilities or complex electronic loads
    - load profile and the nature of the load in all operating modes and with all possible sources of supply using three phase power recorders
    - power supply quality issues in terms of voltage and frequency stability
    - calculation of corrective VARs
    - circuit protection issues and safety
    - nominal location and arrangement
    - types of capacitors to be used
    - use of synchronous motor for large installations
    - possibility of resonance
    - discharge measures
    - types of PFC controls
    - low voltage (LV) PFC, high voltage (HV) PFC and solid-state switched
  - compliance with Australian Standards (AS) encompassing:
    - AS 1013-1971 Shunt capacitors for connection to power frequency systems
    - AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
    - AS/NZS 3947 Low voltage switchgear and control gear
  - testing and commissioning of power factor equipment, including controls
- relevant industry calculations
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0072 Set up and place LV electrical apparatus and associated circuits into service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and place low voltage (LV) electrical apparatus and associated circuits into service.

It includes preparing and setting up electrical apparatus and associated controls, and completing mandatory documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

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UEEEL0005 Develop and connect electrical control circuits

UEEEL0025 Test and connect transformers

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up electrical apparatus and associated controls	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 WHS/OHS hazards not previously identified are noted on job safety assessment, risks assessed and risk control

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		measures implemented
	1.4	Work is appropriately sequenced in accordance with workplace procedures
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Location of electrical apparatus and controls is determined from site inspection and/or job specifications and diagrams
	1.7	Control settings and operating parameters are determined from job specifications and in accordance with workplace procedures
	1.8	Tools, equipment and testing devices needed to commission the system are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9	Checks are undertaken to ensure all components are in place and secure in accordance with workplace procedures and relevant industry standards
	1.10	Need to inspect, test and measure live electrical work and operating system is determined in accordance with WHS/OHS requirements and workplace procedures
2 Set up electrical apparatus and associated controls	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Electrical apparatus and associated controls are adjusted to the required settings
	2.4	Testing/measuring devices are used to observe the operation of electrical apparatus and adjustments of controls, as required
	2.5	Methods for dealing with unplanned events are dealt with in accordance with workplace procedures and safe work practices
	2.6	Set-up is conducted efficiently without waste of materials, services, damage to apparatus or the

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		environment using sustainable energy practices
3 Complete documentation	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Results of work and final operating parameters are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG162A Set up and place LV electrical apparatus and associated circuits into service.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0072 Set up and place LV electrical apparatus and associated circuits into service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- selecting appropriate testing/measuring devices
- making initial adjustments of apparatus and controls correctly
- finely adjusting apparatus and controls based of measured observations
- documenting final operating parameters accurately
- dealing with unplanned events
- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- following job specifications, workplace procedures and instructions
- setting up electrical apparatus and associated controls, including:
  - locating electrical apparatus and controls.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- commissioning processes and procedures and setting up and placing electrical apparatus and associated circuits into service, including:
  - commissioning processes and procedures encompassing:
    - purpose of commissioning
    - commissioning planning and documentation
    - procedures for configuring, calibrating and tuning systems during commissioning systems
    - procedures for validating system performs to specification
    - procedures followed to commission instrument systems
    - purpose and importance of documentation
- problem-solving techniques

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- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant sustainable energy practices
- relevant tool, equipment and testing/measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and job specifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0073 Verify compliance and functionality of special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify compliance and functionality of a special low voltage (LV) electrical installation.

It includes preparing for testing and visual inspection for verifying an electrical installation, and completing reporting and recommendations of finding.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0003 Arrange circuits, control and protection for general electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0018 Select wiring systems and cables for low voltage general electrical installations

UEEEL0005 Develop and connect electrical control circuits

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UEEEL0069 Select and arrange equipment for special LV electrical installations

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Solve problems in alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test an electrical installation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) measures for the site are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 WHS/OHS hazards not previously identified are noted,

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		risks assessed and risk control measures implemented
	1.4	Installation documentation and relevant industry standard are reviewed and applied
	1.5	Appropriate person/s is consulted to ensure the work is coordinated effectively with others
	1.6	Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for operation and safety
	1.7	Preparatory work is checked to ensure no damage has occurred in accordance with workplace procedures
2 Visually inspect the installation	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Installed wiring is checked for suitability for the environments and protected from damage and overheating
	2.5	Cable conductor sizes acquired are inspected to meet current-carrying capacity requirements, voltage-drop and fault-loop impedance limitations in accordance with relevant industry standards
	2.6	Inspection protection methods and devices are validated to meet coordination requirements for overload and short circuit protection in accordance with relevant industry standards
	2.7	Switchgear and control gear are inspected, validated and appropriately rated to meet functional requirements in accordance with relevant industry standards
	2.8	Electrical equipment is checked for compliance with safety requirements in accordance with relevant industry standards
	2.9	Earthing system components are checked, located and conductors correctly sized in accordance with relevant

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		industry standards
	2.10	Markings on switchboards are checked for accuracy and clarity in accordance with relevant industry standards
3 Conduct safety testing	**3.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	3.2	Need to test and measure live electrical work is conducted in accordance with WHS/OHS requirements and workplace procedures
	3.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.4	Mandatory tests are conducted to verify earthing conductor resistance is sufficiently low; insulation resistance is sufficiently high; polarities are correct; circuit connections are correct; and tests are in accordance with relevant industry standards
	3.5	Inspection and testing are conducted to verify fault-loop impedance is sufficiently low and residual current device (RCD) operates as intended in accordance with job requirements and relevant industry standards
4 Report inspection and test findings	**4.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	4.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	Non-compliance defects are identified and reported in accordance with workplace procedures
	4.4	Recommendations for rectifying defects are made in accordance with workplace procedures
	4.5	Mandatory documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying compliance and functionality must include at least two types of installations from the following:

- caravan parks
- construction and demolition sites
- marinas
- medical treatment areas
- moveable premises

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG121A Verify compliance and functionality of special LV electrical installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0073 Verify compliance and functionality of special LV electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- selecting correct tools and testing equipment
- identifying visual non-compliance defects
- using effective methods for conducting mandatory and optional tests
- identifying non-compliance from test results
- identifying causes of non-compliance
- completing mandatory reporting
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS requirements, including using risk control measures
- preparing, inspecting and testing an electrical installation
- reporting inspection and test findings
- reviewing relevant industry documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical installations, testing, compliance and functionality verification of special electrical installations, including:
  - technical standards, regulations and codes for special electrical installations encompassing:
    - additional requirements for special installations
    - caravan parks
    - construction and demolition sites
    - marinas
    - medical treatment areas

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    - moveable premises
    - high voltage (HV) installation in consumer's premises
- mandatory and optional testing and verification requirements applicable to special installations encompassing:
    - testing techniques
    - features of special installations that can be visually inspected
    - caravan parks
    - construction and demolition sites
    - marinas
    - medical treatment areas
    - moveable premises
    - HV installation in consumer's premises
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0074 Wind electrical coils

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up coil former and winding machine/s to wind electrical coils for static and rotating electrical machines.

It includes working safely, using hand and power tools, following technical instructions and set procedures, recording work activities and winding electrical coils.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to wind electrical coils	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and understood

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	1.2	Existing WHS/OHS risk control measures for work preparation are followed
	1.3	Work instructions are identified, obtained and applied
	1.4	Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.5	Materials required for work are obtained in accordance with work instructions and workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out electrical work are obtained and checked for correct operation and safety
2 Wind electrical coils	**2.1**	Existing WHS/OHS risk control measures for winding electrical coils work are followed
	2.2	Winding machines are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Winding wire and insulation are selected in accordance with work instructions and workplace procedures
	2.4	Winding formers and machine are set up in accordance with workplace instructions
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Routine quality checks are conducted to ensure electrical coils are correctly wound with correct wire, number of turns and shape in accordance with work instructions
	2.7	Coil work is completed within timeframe, environment and workplace conditions
3 Complete workplace report	**3.1**	WHS/OHS workplace completion risk control measures are followed
	3.2	Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Winding electrical coils must include the following:	• winding at least four different types of electrical coils in an environment designed specifically for the purpose

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG150A Wind electrical coils.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0074 Wind electrical coils

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- completing workplace reports and documentation
- preparing to wind electrical coils
- winding electrical coils, including:
  - adhering to coil quality and workplace procedures
  - completing workplace report/forms accurately
  - dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - following winding job specifications
  - selecting correct winding wire and insulation
  - setting up and operating winding machine in accordance with safe operating and workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- collecting coil data, including:
  - coil shape
  - gauge
  - number of turns
  - type of wire, coil and insulation
- coil former types, construction/set up and factors which govern coil shape, including:
  - bore size of stator iron core

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  - coil flexibility
  - coil shapes
  - depth of iron below the slots in the iron core
  - end room
  - pressure points between the coils
  - types coil winding formers
- coil winding machines, including:
  - computer operated
  - foot pedal
  - layer winding machine
  - remote foot switch on a flexible lead, variable speed fitted with a face plate
  - variable speed
  - winding head fitted with a chuck
- coil insulations, including:
  - paper laminates
  - cloth, tape and adhesive tape (glass); and polyester glass laminate
  - polyester film
  - purpose
  - adhesive tape (polyester film)
  - temperature ratings
- rewind small and medium-sized solenoid coils, including:
  - strip and record data
  - prepare/insulate coil formers
  - wind each type of coil
  - finishing off process
  - test procedures
- types and purpose of testing devices, including:
  - multimeter
  - insulation resistance tester
  - wheatstone bridge
- types of tests, including:
  - continuity
  - short circuited turns
  - insulation resistance
- testing techniques to identify faulty coils, including:
  - physical inspection.
  - using a testing device
- current industry practices and technologies
- relevant job safety assessments, risk mitigation processes or operational safety precautions
- relevant manufacturer specifications

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to winding electrical coils
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0075 Inspect, test and maintain emergency alarm systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to inspect, test and maintain audible and visual emergency alarm systems and equipment in buildings with fire separated compartments. It does not include control and indicating equipment.

It includes working safely, inspecting, testing and maintaining emergency alarm systems, and completing required documentation.

This unit includes understanding the different types of systems and the relevant parts of the associated Australian Standards and the Building Code of Australia and Building Regulations. Refer to the UEE Electrotechnology Companion Volume Implementation Guide for a list of Standards relevant to this unit.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.). Where equipment has the capability to be connected to a telecommunications network, cabling registration may be required.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

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UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0025 Test and connect transformers

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect, test and maintain emergency alarm systems and equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks assessed and control measures implemented
	1.3 Safety hazards not previously identified are noted on job safety sheet and risk control measures are implemented
	1.4 Work plan is prepared in consultation with others affected by work and sequenced appropriately
	1.5 Required access, permits and permissions are obtained prior to commencing work
	1.6 Nature and location of work, and access to equipment, is determined from documentation and/or appropriate person/s
	1.7 Advice is sought from appropriate person/s to ensure work is coordinated effectively with others
	1.8 Material needed for the work is obtained in accordance with workplace procedures and checked against job

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		requirements
	1.9	Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10	Preparatory work is checked to ensure no damage has occurred and complies with job requirements and specifications
2 Inspect, test and maintain emergency alarm systems and equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS workplace procedures
	2.3	Circuits,machines and/or plant are checked and isolated in accordance with workplace procedures
	2.4	Emergency alarm systems and associated equipment are inspected, tested and maintained to comply with technical industry standards, job specifications and requirements with sufficient access to affect adjustment and maintenance
	2.5	Quality inspections and checks of equipment are undertaken in accordance with workplace procedures
	2.6	Problems are solved safely, using sustainable energy principles and without damaging equipment, the surrounding environment or services in accordance with workplace procedures
3 Complete and report, inspection, testing and maintenance activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to ensure, inspected, tested and maintained equipment conforms to job requirements and specifications
	3.4	Completed work is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Demonstration of this unit of competency must include:

- inspecting, testing and maintaining audible and visual emergency alarm systems and equipment in a building which has fire separated compartments (excluding control and indicating equipment).

Unit Mapping Information

Newly created.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0075 Inspect, test and maintain emergency alarm systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- preparing to test, inspect and maintain emergency systems and equipment
- consulting with relevant person/s
- locating alarm systems and equipment
- arranging required permits, permissions and building access for work to be completed
- isolating circuits and equipment
- testing, inspecting and maintaining emergency alarm systems and equipment
- completing and reporting, inspection, testing and maintenance activities
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- types of alarm systems, equipment and designs
- testing requirements for different alarm systems and equipment
- emergency alarm installation and maintenance, including:
  - arrangements and control
  - labelling of devices operation of emergency alarms
- requirements for emergency alarm systems and equipment contained within:
  - relevant industry standards
  - Building Code of Australia
  - performance based designs
- reporting requirements.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEEL0076 Inspect, test and maintain emergency lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to inspect, test and maintain emergency lighting systems in buildings with fire separated compartments.

It includes working safely, inspecting, testing and maintaining emergency lighting systems, and completing required documentation.

This unit includes understanding the different types of systems and relevant parts of the associated Australian Standards, the Building Code of Australia and Building Regulations. Refer to the UEE Electrotechnology Companion Volume Implementation Guide for a list of Standards relevant to this unit.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.). Where equipment has the capability to be connected to a telecommunications network, cabling registration may be required.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment, and controls

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UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0021 Solve problems in electromagnetic devices

UEEEL0025 Test and connect transformers

AND

UEECD0043 Solve problems in direct current circuits

OR

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect, test and maintain emergency lighting system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks assessed and control measures implemented
	1.3 Safety hazards not previously identified are noted on job safety sheet and risk control measures are implemented
	1.4 Work plan is prepared in consultation with others affected by work and sequenced appropriately
	1.5 Required access, permits and permissions are obtained prior to commencing work
	1.6 Nature and location of work, and access to equipment, is determined from documentation and/or appropriate person/s

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	1.7	Advice is sought from appropriate person/s to ensure work is coordinated effectively with others
	1.8	Material needed for the work is obtained in accordance with workplace procedures and checked against job requirements
	1.9	Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10	Preparatory work is checked to ensure no damage has occurred and complies with job requirements and specifications
2 Inspect, test and maintain emergency lighting system	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS workplace procedures
	2.3	Circuits, machines and/or plant are checked and isolated in accordance with workplace procedures
	2.4	Emergency lighting systems and associated equipment are inspected, tested and maintained to comply with technical industry standards, job specifications and requirements with sufficient access to affect adjustment and maintenance
	2.5	Quality inspections and checks of emergency lighting are undertaken in accordance with workplace procedures
	2.6	Problems are solved safely, using sustainable energy principles and without damaging equipment, the surrounding environment or services in accordance with workplace procedures
3 Complete and report inspection, testing and maintenance activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to ensure inspected, tested and maintained equipment conforms to job requirements and specifications

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3.4 Completed work is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Demonstration of this unit of competency must include:

- inspecting, testing and maintaining emergency lighting systems and equipment in a building which has fire separated compartments.

Unit Mapping Information

This unit replaces and is not equivalent to UEEEL0048 Install and maintain emergency lighting systems.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEEL0076 Inspect, test and maintain emergency lighting systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- preparing to test, inspect and maintain emergency systems and equipment
- consulting with relevant person/s
- locating emergency lighting
- arranging required permits, permissions and building access for work to be completed
- isolating circuits and equipment
- testing, inspecting and maintaining emergency lighting systems
- completing and reporting inspection, testing and maintenance activities
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- battery systems used in emergency lighting, including types of batteries and their characteristics, recharging arrangements and procedures for testing emergency lighting
- design of emergency escape luminaire installation
- electrical wiring and equipment for centrally supplied systems
- emergency lighting and exit sign luminaires
- emergency lighting control systems
- emergency lighting installation and maintenance, including:
  - arrangements and control
  - labelling of devices operation of emergency lighting
- emergency power supplies for single and centrally supplied systems
- installation and maintenance workplace procedures for single point systems, including battery replacement and cleaning of emergency luminaires
- installation of electrical wiring and equipment for centrally supplied systems, including:

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  - circuit voltage-drop
  - protection against over current and the electrical installation against fire
  - segregation or identification of sub-mains and arrangement of final sub-circuits
- inspection of electrical wiring and equipment for centrally supplied and single point systems, including:
  - the required procedures for six and twelve-monthly inspections
  - maintenance and inspection requirements and relevant industry standards, and Building Code of Australia
  - information required for operating and maintaining the system
  - maintenance manual
  - provision for the recording of maintenance
- quality assurance processes
- requirements for self-contained emergency escape luminaires and exit signs, including:
  - arrangement and control, electrical requirements and control equipment
  - batteries and battery chargers
  - self-contained automatic discharge testing facilities
  - suitability for operating temperatures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0001 Conduct detailed inspection of electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct detailed inspections of the explosion-protection aspects of electrical installations for hazardous areas. It includes using a verification dossier; working safely in a hazardous area; conducting initial, periodic and sample inspections; complying with inspection standards; and recording inspection results. It is adopted from clause 2.7 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to inspection functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

and

UEEHA0007 Plan electrical installations for hazardous areas

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or

UEEHA0005 Install explosion-protected equipment and associated apparatus and wiring systems

or

UEEHA0006 Maintain equipment associated with hazardous areas

Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for inspection	**1.1** WHS/OHS procedures and safe work methods are reviewed in preparation to work in a classified hazardous area
	1.2 Knowledge of the scope of detailed inspections specified in inspection standards and site inspection program is applied to work preparation
	1.3 Classification of the area is ascertained from hazardous area layout drawings retained in the verification dossier
	1.4 Type and grade of inspection is ascertained from the inspection schedule retained in the verification dossier
	1.5 Classification details and specified location of each item of equipment and circuits subject to inspection are determined from design drawings and equipment certification documentation retained in the verification dossier
	1.6 Special tools, equipment and testing devices needed to carry out the inspection are checked to ensure they are safe and serviceable, and any defective items are either rectified or replaced

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2 Conduct inspection	**2.1**	Safe work methods relating explosive atmospheres and inspections, including isolation of equipment, are obtained and applied
	2.2	Knowledge of the explosion-protection aspects of equipment and hazardous area installation requirements is applied
	2.3	Equipment, systems and installation are inspected for compliance with the design specifications retained in the verification dossier and in accordance with the inspection schedule and standards
	2.4	Where applicable in a given jurisdiction, an appropriately authorised person is directed to remove equipment enclosure covers and internal components, where needed, to enable inspection
	2.5	Arrangements are made to store and protect equipment covers and components that are removed to enable inspection
	2.6	Where applicable in a given jurisdiction, after the inspection of each item, an appropriately authorised person is directed to replace equipment covers and components in a manner that ensures the integrity of the explosion-protection system
3 Record results of detailed inspection	**3.1**	Results of inspection are recorded in accordance with inspection standards
	3.2	Defects such as equipment deterioration, faults and unauthorised modifications are recorded in accordance with inspection standards
	3.3	Actions to rectify defects are specified in the inspection record
	3.4	The inspection record is forwarded to the appropriate personnel for inclusion in the verification dossier in accordance with inspection standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducing detailed inspection of electrical installations for hazardous areas must apply to:	• new and existing installations and existing installation after repairs and maintenance have been carried out
Conducting detailed inspection of electrical installations for hazardous areas be guided by:	• content of the verification dossier and requirements of inspection standards requiring the use of access equipment, tools and testing devices

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0001 Conduct detailed inspection of electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing to conduct a detailed inspection of the electrical installation, including:
  - reviewing safe work methods associated with the classified area in which the work is to be carried out
  - determining the scope of inspection, including:
    - ascertaining the area classification from hazardous area layout drawings retained in the verification dossier
    - ascertaining the type and grade of inspection from the inspection schedule retained in the verification dossier
    - determining classification details and the specified location of each item of equipment and circuits subject to the inspection from design drawings and equipment certification documentation retained in the verification dossier
  - checking safety and serviceability of special tools, equipment and testing devices needed to carry out the inspection
- conducting detailed inspections of the electrical installation encompassing:
  - accepting and following safe work methods relating to the work
  - carrying out the detailed inspection to requirements, including:
    - conducting detailed inspections for compliance with design specifications and in accordance with inspection schedules and standards
    - making arrangements to store and protect parts of equipment dismantled in order to conduct inspection
  - where applicable in a given jurisdiction, directing an authorised person to:
    - disconnect and dismantle equipment as necessary to conduct the inspection
    - reconnect and reassemble equipment in a manner that ensures the integrity of the explosion-protection system after equipment is inspected
- completing records of detailed inspections of the electrical installation, including:
  - recording the results of the detailed inspection including equipment deterioration, faults and unauthorised modifications
  - specifying actions to rectify defects found in the inspection

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- forwarding the inspection record for inclusion in the verification dossier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safe work procedures for explosive atmospheres, including:
  - Work health and safety (WHS)/occupational health and safety (OHS) procedures for working in hazardous areas
  - permit to work systems that cover the hazardous aspects of specific work and location
- scope and aspects of detailed inspections, including:
  - inspection program for the site based on schedules specified by inspection standards
  - periodic inspection schedules covering equipment, installations and environment for:
    - Ex ‘d’, Ex ‘e’ and Ex ‘n’ installations
    - Ex ‘i’, Ex ‘iD’ and Ex ‘nL’ installations
    - Ex ‘p’ and Ex ‘pD’
    - Ex ‘t’
  - specific aspects of initial inspections including ensuring:
    - equipment is appropriate to the equipment protection level (EPL)/zone requirements of the location
    - equipment group is correct
    - equipment maximum surface temperature is correct
    - equipment circuit identification
    - cable gland
    - type of cable
    - sealing
    - fault-loop impedance or earthing resistance
    - overload protection
  - additional aspects of initial inspection schedule requirements for types of protection:
    - ‘d’ – flameproof enclosure
    - ‘e’ – increased safety
    - ‘i’ and ‘iD’ – intrinsic safety
    - ‘p’ and ‘pD’ – pressurised enclosure
    - ‘n’ - non-sparking enclosure
    - ‘t’ – protection by enclosure
    - ‘m’ and ‘mD’ -encapsulation
    - ‘o’ oil-immersion
    - ‘q’ powder-filling
    - ‘v’ – ventilation

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    - ‘p’ – pressurisation — rooms
- requirements for installing equipment and wiring systems for explosive atmospheres, including:
    - required documentation
    - installation requirements for protection from dangerous (incendive) sparking, including:
        - earthing system requirements
        - SELV and PELV systems
        - electrical separation
        - limitation of equipment installed above a hazardous area
    - requirements for potential equalisation, including:
        - various earthing systems
        - bonding systems
        - cable armour and screens
        - exposed conductive parts
        - metallic enclosures
        - cathodic protection
        - temporary bonding
    - wiring systems, including:
        - limitation on the use of aluminium conductors
        - fixed cable and wiring systems permitted for Groups I, II and III
        - wiring systems permitted and not permitted in or above hazardous areas
        - cables supplying transportable and portable equipment
        - flexible connections and flexible cables
    - connection to equipment, including:
        - cable glands and blanking elements per enclosure type
        - non-electrical entries
        - conduit systems
        - termination of conductors
        - treatment of unused core
        - unused opening/entries in enclosures
        - joining cables
        - openings in walls
        - passage and collection of flammables
    - additional requirements for each type of explosion protection
- cable and conduit termination devices and techniques, including:
    - cable glands, conduits and sealing:
        - types of glands and components
        - requirements for fitting glands and applying sealing compound
        - requirements for conduit seals and applying sealing compound.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions and include:

- an area designated as a hazardous area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the ‘authorised person’ for the site
- a qualified supervisor.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, safe work methods, explosive atmosphere equipment, installation and inspection standards, and verification dossier for the site, including:
  - design documentation
  - area classification drawings
  - certification documents for each item of equipment
  - inspection records
  - maintenance records.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0002 Conduct visual and close inspection of electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct visual and close inspections of the explosion-protection aspects of electrical installations associated with hazardous areas. It includes working safely in a hazardous area; identifying by visual or close inspection conditions of the electrical installation that affect the integrity of explosion-protection; and documenting inspection findings. It is adopted from clause 2.3 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to basic inspection functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

Competency Field

Hazardous

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for inspection	**1.1** Safe work methods for undertaking visual and close inspections are obtained and interpreted
	1.2 Knowledge of the purpose, scope and limitations of visual and close inspections is applied to preparation for the work
	1.3 Type and location of each item of equipment subject to inspection are determined from the inspection program for the site
2 Carry out verification of compliance	**2.1** Safe work methods for undertaking visual and close inspections in hazardous areas, including isolation of equipment, are applied
	2.2 Knowledge of defects impairing the integrity of the type of protection that are identifiable by visual and close inspection is applied
	2.3 Equipment is visually and closely inspected and defects impairing the integrity of the type of protection are identified
3 Record inspection results	**3.1** Defects identified by visual and close inspection are recorded in accordance with inspection standards and site record systems
	3.2 Documentation in relation to all aspects of the inspection is forwarded to the authorised person for inclusion in the verification dossier

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0002 Conduct visual and close inspection of electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- preparing to conduct a visual and close inspection of electrical installations for gas and dust hazardous areas, including:
  - reviewing safe work methods associated with the classified area in which the work is to be carried out
  - determining the type and location of equipment subject to the inspection
- conducting visual and close inspections of electrical installations in gas and dust hazardous areas, including:
  - obtaining interpreting and applying safe work methods
  - identifying defects impairing the integrity of the type of protection
- completing record of visual and close inspections of electrical installations in gas and dust hazardous areas, including:
  - recording defects identified in the inspection impairing the integrity of the type of protection
  - forwarding the inspection record for inclusion in the verification dossier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- purpose, scope and limitations of visual and close inspections, including:
  - inspection program for the site based on schedules specified in inspection standards
  - periodic inspection schedules covering equipment, installations and environment for:
    - flameproof - Ex ‘d’
    - increased safety - Ex ‘e’
    - non-sparking - Ex ‘n’
    - intrinsic safety - Ex ‘i’

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    - intrinsic safety - Ex ‘iD’
    - non-sparking - Ex ‘nL’
    - pressurisation - Ex ‘p’
    - pressurisation - Ex ‘pD’
    - protection by enclosure - Ex ‘tD’
- aspects of close and visual inspections, including:
    - items subject to visual and close inspection listed in schedules specified in inspection standards
    - defects impairing the integrity of the type of protection that can be identified by visual and close inspection, including:
        - excessive corrosion
        - missing cover and mounting bolts
        - enclosure or cable damage
        - non-secured cables
        - exposed armouring/cable cores at glanding points
        - missing or illegible labels.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions an include:

Where evidence is gathered from a simulated work environment, the environment shall be arranged to include the following:

- an area designated as an explosive atmosphere area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the ‘authorised person’ for the site
- a qualified supervisor.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry

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- safe work methods
- site inspection schedule
- inspection reporting system
- explosion-protected electrical installation with and without defects that can be detected by visual and close inspection.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine the explosion-protection requirements to meet a specified classified hazardous area. It includes determining the type of explosion-protected equipment for a given explosive atmosphere. It also includes reading and interpreting the explosion-protection fundamentals in explosive atmosphere technical standards; understanding the information given in certification documents, verification dossiers and equipment marking; identifying the design features of each type of explosion-protected equipment; understanding actions and conditions that would void the explosion-protection afforded by each equipment type; and understanding where each equipment type may be used. It is adopted from clause 2.4 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to design, installation, maintenance, inspection, auditing, and repair and overhaul functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to review explosion-protection technical standards	**1.1** Technical standards specifying the requirements to which each type of explosion-protected equipment is required to comply are identified
	1.2 A verification dossier for a site that has gas hazards is reviewed and requirements for the explosive atmospheres are established
	1.3 A verification dossier for a site that has dust hazards is reviewed and requirements for the explosive atmospheres are established
2 Ascertain the requirements for each explosion-protection type	**2.1** Protective features of each equipment type are identified through application of knowledge of explosion-protection methods
	2.2 Equipment standards are reviewed to establish the compliance requirements for each equipment type
	2.3 Aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance are determined from knowledge of equipment types and equipment standards
	2.4 Items of explosion-protected equipment are examined to identify any condition that would void the protection
	2.5 Where particular explosion-protected equipment types may be used, relevant technical standards, equipment certification and the verification dossier for a given site are established

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3 Identify acceptable equipment certification	**3.1** Knowledge of the equipment certification process and acceptable standards are applied
	3.2 The required marking on certified equipment is obtained from relevant technical standards
	3.3 The suitability of explosion-protection equipment items for a given application and location is ascertained from relevant technical standards, certification documents, equipment marking and the verification dossier for a given site

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining the explosion-protection requirements to meet a specified classified hazardous area must include:	• using standards, equipment certification and installation design documentation and site-specific verification dossiers for any application in which explosion-protected equipment is used

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- selecting the correct standard/s relevant to each equipment type
- establishing the requirement for explosive atmospheres from a verification dossier
- examining flameproof Ex ‘d’, increased safety Ex ‘e’ and intrinsic safety Ex ‘i’ items of explosion- protected equipment and identifying any condition that would void the protection
- ascertaining the suitability of items of explosion-protected equipment for a given application and location from equipment standards, certification documents, equipment marking and the verification dossier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- methods for preventing ignition of a explosive atmosphere by an electrical source including:
  - exclusion method, including:
    - dust ignition protection type ‘tD’ or ‘t’
    - pressurisation ‘p’
    - encapsulated ‘m’
    - oil-immersed ‘o’
    - powder filling ‘q’
  - explosion containment method - flameproof ‘d’ enclosure type
  - energy limitation, including:
    - intrinsic safety ‘i’
    - protection type ‘n’ (e.g. non-sparking, hermetically sealed and enclosed break)
  - avoidance of ignition source, including:
    - increased safety ‘e’

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    - protection type ‘n’
  - dilution-ventilation
- equipment and circuits protected by the flameproof (Ex ‘d’) enclosure type, including:
  - how flameproof-type enclosures work to provide explosion protection
  - features of flameproof enclosures and their function, including:
    - enclosure materials
    - flame paths
    - fasteners
    - gaskets
    - enclosure entries
    - breathing and drain devices
  - attributes of flameproof enclosures, including:
    - integrity under pressure
    - suitability for power switching equipment
    - situations where this type can be used
- aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance, including:
  - installed location
  - cable/conduit entries
  - flame paths
  - gaskets
  - fasteners
  - pressure piling
- equipment and circuits protected by the increased safety (Ex ‘e’) method, including:
  - how increased safety ‘e’ type works to provide explosion protection
  - features of increased safety and their function, including:
    - electrical connections
    - length of conductors within an enclosure
    - clearances between bare conductive parts
    - creepage distances
    - enclosure entries
    - ingress protection (IP) rating of enclosures
    - temperature limitation
    - certified components
  - attributes of increased safety including:
    - absence of sparking contacts
    - situations where this type can be used
  - aspects that are vulnerable to voiding the protection due to poor installation or maintenance, including:
    - installed location

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    - electrical connections
    - clearances
    - preservation of temperature limitations
    - components
- purpose and characteristics of the design features of equipment and circuits protected by the intrinsic safety (Ex ‘i’) type, including:
  - how the intrinsic safety type works to provide explosion protection
  - features of intrinsic safety and their function, including:
    - associated equipment
    - simple devices
    - dependant components
    - infallible components, assemblies and connections
    - external wiring
    - safety barrier
  - attributes of intrinsic safety including:
    - levels of protection
    - ignition energy limiting
    - entity versus integrated system concept
    - situations where this type can be used
  - aspects that are vulnerable to voiding the protection due to poor installation or maintenance, including:
    - installed location
    - stored energy sources
    - insulation ratings
    - external wiring
    - methods of earthing/bonding
- purpose and characteristics of the design features of equipment and circuits protected by the type of protection ‘n’ (Ex ‘n’) technique, including:
  - how type of protection ‘n’ works to provide explosion protection
  - features of type of protection ‘n’ and their application, including:
    - non-sparking device ‘nA’
    - range of devices and components designated ‘nC’
    - energy-limited equipment ‘nL’
    - associated energy-limited equipment ‘[nL]’ or ‘[Ex nL]’
    - self-protected energy-limited equipment ‘nA nL’
    - restricted-breathing enclosure ‘nR’
  - aspects that are vulnerable to voiding the protection due to poor installation or maintenance, including:
    - installed location
    - enclosures

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    - cable/conduit entries
    - external connections
- purpose and characteristics of the design features of equipment protected by the encapsulation (Ex ‘m’) technique including:
    - how the encapsulation type works to provide explosion protection
    - features of type of protection ‘m’ and their function, including:
        - levels of protection
        - temperature limitations
        - protective devices
        - situations where this type can be used
    - aspects that are vulnerable to voiding the protection due to poor installation or maintenance
- purpose and characteristics of the design features of equipment by the oil immersion (Ex ‘o’) technique, including:
    - how the oil immersion type works to provide explosion protection
    - features of type of protection ‘o’ and their function, including:
        - protective liquid
        - limiting temperature
        - immersion depth
        - situations where this type can be used
- purpose and characteristics of the design features of equipment protected by the powder filled (Ex ‘q’) technique, including:
    - how the powder-filling type works to provide explosion protection
    - features of the type of powder-filling ‘q’ and their function, including:
        - permanently sealed enclosures
        - enclosures intended to be opened for repair
        - temperature limitation
        - types of devices
        - situations where this type can be used
- purpose and characteristics of the design features of equipment and circuits protected by the pressurisation enclosure (Ex ‘p’) technique including:
    - how the pressurization enclosure type works to provide explosion protection
    - features of the type of pressurization enclosure ‘p’ and their function, including:
        - types of pressurisation
        - pressurisation system
        - purging
        - temperature limitation
        - safety devices
        - containment systems
        - protection types

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        - situations where this type can be used
    - aspects that are vulnerable to voiding the protection due to pressure failure, including:
        - inadequate cable/conduit entries
        - poorly secured doors and covers
        - failed safety devices
        - negating purging requirements after maintenance
- purpose and characteristics of the design features of equipment protected from dust ignition by enclosure (Ex ‘t’), including:
    - how the dust ignition by enclosure type works to provide explosion protection
    - features of dust ignition by enclosure ‘t’ and their function, including:
        - level of protection
        - protective devices
        - gaskets
        - cable/conduit entries
        - situations where this type can be used
        - type protection ‘pD’ in legacy systems
    - aspects that are vulnerable to voiding the protection due to poor installation or maintenance, including:
        - cable/conduit entries
        - sealing
        - dust layer accumulation
- common characteristics of explosion-protection types, including:
    - criteria on which equipment protection levels (EPLs) are assigned
    - the purposes of ‘temperature classification’ and ‘equipment grouping’
    - equipment markings (nameplate)
    - limitations of non-metallic or specific alloy enclosures
    - the purpose and use of conformity and certification/approval for equipment used in explosive atmospheres
    - environmental conditions that may impact on explosion-protection techniques
    - the principles and applications of other and mixed explosion-protection techniques
- standards to which explosion-protected equipment is required to comply, including
    - standards to which the protective features of each type of explosion protection are required to comply
    - typical content of equipment (Ex) certificates, including:
        - explosion-protection parameters
        - electrical parameters
        - instruction and limitation of use
    - verification dossiers, including:
        - purpose
        - content

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- Ex certification schemes to accepted standards, including
  - purpose and scope of certification schemes
  - accepted certification schemes
  - processes for having equipment certified under the acceptable Ex schemes, including:
    - scheme procedures
    - quality management requirements
    - conformance testing and assessment
    - requirements for ongoing certification.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate access equipment, explosive atmosphere equipment, tools and testing devices permitted in a hazardous area, materials and personal protective equipment (PPE) currently used in industry
- applicable documentation and workplace procedures, including:
  - safe work methods
  - technical standards for explosive-protected electrical equipment types and explosive atmospheres
  - verification dossier for a classified gas atmosphere area
  - verification dossier for a classified dust atmosphere area
  - safety procedures for the area
  - equipment certification documents
- defective and non-defective items of Ex ‘d’, Ex ‘e’ and Ex ‘i’ explosion-protected equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to enter a classified hazardous area to undertake work related to electrical equipment. It includes the obligations and safety practices for entering a classified hazardous area. It covers risks associated with flammable gas/vapours or combustible dust and the need for areas where such substances may be present to be classified as explosive atmosphere areas; basic principles of explosion-protected electrical equipment; the limitations of devices/equipment that be may be taken into the area; health and safety responsibilities; and the necessary procedures to enter and work in explosive atmosphere areas. It is adopted from clause 2.2 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit can be used in relation to any job function requiring entry to a classified hazardous area.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment, such as elevated work platforms (EWPs), in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

Not applicable.

Competency Field

Hazardous

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter and work in a classified hazardous area	**1.1** The need for specific safety, entry and work procedures is understood based on knowledge of the properties of flammable substances, the nature of hazardous areas and explosion-protected electrical equipment, and the responsibilities of owners/occupiers for safety of the area
	1.2 Site safety procedures related to the explosive atmosphere area are obtained from the person authorised to issue site safety procedures and entry and clearance-to-work permits
	1.3 Site safety procedures related to the hazardous area are obtained, interpreted and applied
	1.4 Permission to take required devices and equipment into a hazardous area is obtained from the authorised person
	1.5 Entry and clearance-to-work permits are obtained from the authorised person, read and understood
2 Follow safety instructions and procedures in a classified explosive atmosphere	**2.1** Site safety procedures including entry and clearance-to-work permits are followed
	2.2 Limitations on the use of devices and equipment permitted that can be taken into the hazardous area are followed
	2.3 Instructions and signage related to the hazardous area are followed
	2.4 Emergency procedures and instructions are followed

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Entering a classified hazardous area to undertake work related to electrical equipment. must include:	• entering and applying safety responsibilities in an area classified as hazardous

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing to enter a hazardous area, including:
  - obtaining, interpreting and applying hazardous area site safety procedures
  - seeking permission from authorised person/s to take particular devices and equipment into a hazardous area
  - obtaining, interpreting and applying the conditions of entry and clearance-to-work permit
- complying with all safety requirements for the hazardous area, including:
  - limitations on the use of devices/equipment permitted to be taken into the hazardous area
  - entry permit and clearance-to-work conditions
  - hazardous area instructions and signage
  - emergency procedures and instructions

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- nature of hazardous areas and explosion protection, including:
  - the standard definition of a hazardous area
  - conditions in an explosive atmosphere that will lead to ignition, combustion and propagation of a hazardous area
  - the explosive nature of flammable substances in the form of gas, vapour, dust, fibres or flyings
  - typical parameters for flammable gases and vapours such as lower explosive limits (LEL) and upper explosive limits (UEL), flash point, auto-ignition temperature, minimum ignition energy and relative density
  - the toxic nature of gases and vapours and potential harmful consequences
  - typical parameters for combustible dusts such as minimum explosible concentration, minimum cloud and layer ignition temperatures, minimum ignition energy and the

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considerations of clouds versus layers of dust
  - the classifications given to hazardous areas
  - electrical equipment as a potential source of ignition
  - characteristics of devices/equipment that require authorisation to be taken into a hazardous area
- responsibilities for the safety of a hazardous area and the responsibilities of persons entering a hazardous area, including:
  - responsibilities of owners/occupiers of sites where production, process, handling and/or storage activities may cause explosive atmospheres to be present
  - features and purpose of an entry permit and clearance-to-work system
  - safety precautions to be taken while in a hazardous area
  - safety procedures to be followed before entering a hazardous area
  - typical procedures to be followed in the event of an emergency.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions and include:

- an area designated as a hazardous area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the ‘authorised person’ for the site
- a qualified supervisor.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate access equipment, explosive atmosphere equipment, tools and testing devices permitted in a hazardous area, materials and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, safe work methods, plan of the site showing delineation of classified zones, regulations, codes of practice and details of:
  - signage used on the site
  - limitations of devices and equipment that may be taken into the area
  - limitations of work that may be undertaken in the area

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- an entry and clearance-to-work system.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0005 Install explosion-protected equipment and associated apparatus and wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install explosion-protected equipment and associated apparatus and wiring systems for hazardous areas. It includes understanding and applying the explosion-protection aspects of installing electrical equipment and wiring systems for hazardous areas; matching items of explosion-protected equipment with that specified for a given location; and complying with installation standards and retaining/completing the required documentation. It is adopted from clause 2.5 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to hazardous area electrical installation functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install equipment and wiring	**1.1** WHS/OHS procedures and safe work methods are obtained and interpreted
	1.2 Knowledge of requirements for installing electrical equipment and wiring for a hazardous area is applied to work preparation
	1.3 Types of explosion-protected equipment and wiring systems to be installed are determined from the area classification and planning and/or design documentation
	1.4 Location in which specific items of equipment and circuits are to be installed is determined from the area classification and planning and/or design documentation
	1.5 Explosion-protected equipment markings are checked to ensure they conform to their certification document and planning and/or design specifications
	1.6 Certification document supplied with each item of equipment is collected for forwarding to the relevant person for filing in the verification dossier
	1.7 Cables and cable enclosures to be installed are checked to ensure they conform to planning and/or design documentation
	1.8 Cable glands, seals and conductor terminations are checked to ensure they are compatible with the cable types and equipment specified in the planning and/or design documentation

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	1.9	Special tools, equipment and testing devices needed to carry out the installation work are checked to ensure they are safe and serviceable, and any defective items are either rectified or replaced
2 Install equipment and wiring systems	**2.1**	Safe work methods statements (SWMS) relating to explosive atmospheres are obtained and applied
	2.2	Installation of equipment and wiring systems demonstrates application of knowledge of requirements for installing electrical equipment and wiring for hazardous areas
	2.3	Equipment enclosure covers and internal components are removed where needed to enable installation and covers, components and their fixing devices are stored to protect them against loss or damage
	2.4	Equipment is installed to conform with the planning and/or design documentation, installation standards and within the limits specified by the equipment certification and manufacturer's instructions
	2.5	Equipment is installed in a manner that maintains the integrity of protection afforded by the equipment type
	2.6	Cables and conduits are installed to conform with installation standards, planning and/or design documentation
	2.7	Cables and conduits are terminated to conform with installation standards and equipment certification and manufacturer's instructions
	2.8	Circuits are tested before connecting them to devices to ensure protective earth resistance is sufficiently low, insulation resistance is safe, polarity and connections are correct and each circuit complies with installation standards
	2.9	Conductors are terminated and connected complying with planning and/or design documentation, installation standards, equipment certification and manufacturer's instructions
	2.10	Equipment covers and internal components are removed to enable installation and are replaced ensuring the integrity of the equipment type is not compromised

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3 Confirm that installation is complete	**3.1**	Appropriate person/s is notified that the installation has been completed and is ready for the initial inspection
	3.2	Action is taken to rectify non-conformance and general installation defects found during the initial inspection and to ensure the installation complies with requirements
	3.3	Documents used during the installation are forwarded to the person responsible for compiling the verification dossier

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing explosion-protected equipment and associated apparatus and wiring systems must apply to:

- new installations and additions, and repairs to existing installations related to a classified hazardous area

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0005 Install explosion-protected equipment and associated apparatus and wiring systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing to install, including:
  - reviewing safe work methods associated with the classified area in which the work is to be carried out
  - determining the types and locations of equipment and cabling to be installed from area classification and planning and/or design documentation
  - completing pre-installation checks, including:
    - equipment supplied complies with planning and/or design specifications
    - equipment marking conforms to the certification documentation provided with the equipment
    - cables and cable enclosures to be installed conform to planning and/or design documentation
    - cable glands, seals and conductor terminations are suitable for the cable types and equipment specified
    - serviceability and safety of tools and testing devices needed to carry out the installation work is checked
- installing Ex ‘d’, Ex ‘e’, Ex ‘i’ and Ex ‘t’ equipment and associated apparatus and wiring systems, including:
  - obtaining and applying safe work method statements (SWMS) relating to the work
  - carrying out the installation to requirements, including:
    - removing equipment enclosure covers and internal components and their fixing devices to enable installation and safe storage
    - installing equipment to conform to planning and/or design documentation, installation standards, manufacturer’s instructions and limitations
    - installing equipment in a manner that maintains the integrity of the equipment protection type
    - testing circuits before connecting them to ensure:
      - resistance of protective earthing conductors is sufficiently low

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        - insulation resistance is safe
        - polarity and connections are correct
    - replacing internal components and equipment covers previously removed to enable installation
- terminating cables and conduits conforming with installation standards and equipment certification and manufacturer's instructions, including:
    - installing conduit systems, including seals to meet hazardous area requirements (gases and liquids)
    - terminating cables with a barrier gland (gases and liquids)
    - terminating multicore, steel wire armoured (SWA), overall screened and individual screened cable into an enclosure
    - terminating and connecting conductors in accordance with requirements
- replacing equipment internal components and covers ensuring the integrity of the equipment type
- confirming that installation is complete, including:
    - notifying an appropriate person that the installation is completed and ready for the initial inspection
    - taking action to rectify any installation defects revealed by the initial inspection
- forwarding documents used during the installation to the person responsible for compiling the verification dossier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safe work procedures for explosive gas atmospheres, including:
    - work health and safety (WHS)/occupational health and safety (OHS) procedures for working in hazardous areas
    - permit to work that covers the hazardous aspects of the specific work and location
- requirements for installing equipment and wiring systems for explosive atmospheres, including:
    - required documentation
    - installation requirements for protection from dangerous (incendive) sparking including:
        - earthing system requirements
        - SELV and PELV systems
        - electrical separation
        - limitation of equipment installed above a hazardous area
    - requirements for potential equalisation for the following:
        - various earthing systems
        - bonding systems

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    - cable armour and screens
    - exposed conductive parts
    - metallic enclosures
    - temporary bonding
  - limitation of cathodic protection
  - wiring systems, including:
    - limitation on the use of aluminium conductors
    - fixed cable and wiring systems permitted for Groups I, II and III
    - the wiring systems permitted and not permitted in or above hazardous areas
    - cables supplying transportable and portable equipment
    - flexible connections and flexible cables
  - connection to equipment, including:
    - cable glands and blanking elements per enclosure type
    - non-electrical entries
    - conduit systems
    - termination of conductors
    - treatment of unused core
    - unused opening/entries in enclosures
    - joining cables
    - openings in walls
    - passage and collection of flammables
- additional requirements for each type of explosion protection
- cable and conduit termination devices and techniques, including:
  - cable glands, conduits and sealing including:
  - types of glands and components
  - techniques for fitting glands and applying sealing compound
  - techniques for using conduit seals and applying sealing compound
- conductor terminations and techniques, including:
  - installing conduit systems, where applicable, including seals to meet hazardous area requirements (gases and liquids)
  - terminating a cable with a barrier gland (gases and liquids)
  - terminating a multicore, SWA, overall screened and individual screened cable into an enclosure
  - methods for terminating MIMS cable in accordance with manufacturer’s instructions
  - testing termination/connections of installed cables/circuits.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions and include:

- an area designated as a hazardous area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the ‘authorised person’ for the site
- a qualified supervisor.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- applicable documentation including workplace procedures, safe work methods, verification dossier for the site and planning and/or design documentation specifying:
  - Ex ‘d’, Ex ‘e’, Ex ‘i’ and Ex ‘t’ equipment to be installed
  - cables and cable enclosures to be installed
  - cable glands, seals and conductor terminations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0006 Maintain equipment associated with hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain equipment associated with hazardous areas. It includes determining required remedial maintenance from inspection reports; carrying out remedial and breakdown maintenance in compliance with regulations and safe working methods, standards and manufacturer's instructions; and completing the necessary maintenance documentation. It is adopted from clause 2.6 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

For the purpose of applying this unit, 'hazardous areas' are defined as areas in which an explosive atmosphere may be present.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to carry out maintenance of equipment	**1.1** WHS/OHS policies and procedures to work in hazardous areas are identified and applied
	1.2 Area classification and details of explosion-protected equipment and wiring are ascertained from hazardous area zone drawings and equipment certification documents held in the verification dossier
	1.3 Extent of remedial maintenance to be conducted is determined from regulatory requirements and/or inspection records held in the verification dossier
	1.4 Extent of breakdown maintenance is evaluated and confirmed with person/s reporting the breakdown
	1.5 Limits of breakdown maintenance that can be carried out in situ with regard to explosion risk is determined in consultation with technical management personnel
	1.6 Required tools, equipment and testing devices are obtained and checked for operational safety
2 Carry out equipment maintenance	**2.1** WHS/OHS policies and procedures for working in hazardous areas, including isolation of equipment, are followed
	2.2 Work is carried out in accordance with inspection records
	2.3 Requirements and limitations of scheduled and breakdown remedial maintenance requirements are applied

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	2.4	Equipment is adjusted and maintained within the limits permitted by the equipment certification and in accordance with the manufacturer's instructions
	2.5	Certification documentation for like-for-like replacement parts is sighted to ensure compliance with the equipment certification and manufacturer's instructions
	2.6	Circuits of equipment being withdrawn from service are isolated and terminated safely and in accordance with maintenance standards
	2.7	Flexible cables and cords are examined and removed from service if they are not in immediate use or are found to be defective or damaged
	2.8	Spare equipment**,** flexible cables and cords are maintained and stored where they are not likely to suffer deterioration or damage
3 Complete maintenance work and documentation	**3.1**	Inspection of maintenance work is arranged in compliance with maintenance standards and regulatory requirements
	3.2	Action is taken to rectify maintenance defects (non-conformances) found during the maintenance work inspection
	3.3	Safety assessment for isolation of equipment is recorded in accordance with maintenance standards
	3.4	Completed maintenance work is documented in accordance with requirements and forwarded to relevant person/s for inclusion in the verification dossier

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Maintaining equipment associated with hazardous areas must include:

- maintaining electrical equipment in a classified hazardous area

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0006 Maintain equipment associated with hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing to undertake maintenance of electrical equipment associated with explosive atmospheres, including:
  - reviewing safe work methods associated with the classified area in which the work is to be carried out
  - ascertaining the area classification and details of equipment from documentation held in the verification dossier
  - reviewing inspection records to determine the extent of remedial maintenance
  - evaluating the extent of breakdown maintenance in consultation with reporting personnel
  - consulting with technical personnel to determine the limits of maintenance and repair that can be carried out in situ
  - checking the safety of compliant tools, equipment and testing devices required to carry out the inspection
- maintaining electrical equipment associated with explosive atmospheres as specified in the inspection records, including:
  - following safe work methods relating the work, including isolation of equipment
  - adjusting and repairing equipment within the limits permitted by the equipment certification regulations and in accordance with manufacturer’s instructions
  - using replacement parts permitted by the equipment certification, regulations and manufacturer’s instructions
  - isolating and terminating circuits of equipment withdrawn from service in accordance with applicable standards
  - examining flexible cables and cords and removing them from service if not in immediate use or if showing defections
  - maintaining spare equipment flexible cable and cords and storing them to prevent deterioration or damage
- completing maintenance work inspections and documentation, including:
  - arranging for inspection of the maintenance work
  - rectifying maintenance defects (non-conformances) found by the maintenance work

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inspection
- recording safety assessments undertaken for isolation equipment during maintenance
- completing maintenance work, documenting the work and forwarding the documentation for inclusion in the verification dossier.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safe work procedures for explosive atmospheres including:
  - work health and safety (WHS)/occupational health and safety (OHS) procedures for working in hazardous areas
  - permit to work systems that cover the hazardous aspects of specific work and locations
- requirements and limitations of remedial maintenance, including:
  - scheduled maintenance specified in inspection records for particular items of equipment
  - limits of maintenance in response to a breakdown
  - isolation and termination of circuits of equipment being withdrawn from service
  - compliance standards, equipment certification and manufacturer's instructions regarding use, maintenance and repair of explosion-protected equipment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions and include:

- an area designated as a hazardous area which is a close facsimile of a real work environment
- an area entry point
- delineation of the area into zones for both gas and dust
- a person to act as the 'authorised person' for the site
- a qualified supervisor.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate access equipment, explosive atmosphere equipment, tools and

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testing devices permitted in a hazardous area, materials and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, safe work methods, explosive atmosphere installation and inspection standards, industry standards, equipment specifications, regulations, codes of practice and operation manuals
- verification dossier for the site, including:
  - design documentation
  - area classification drawings
  - certification documents for each item of equipment
  - inspection records
  - maintenance records
- clearance-to-work permit in particular locations and situations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0007 Plan electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan electrical installations for hazardous areas by selecting compliant explosion-protected equipment and wiring systems. It includes determining the extent of the installation from area classification documents and plant specifications; identifying the hazardous area zones; referencing manufacturer's data and plant design specifications to select and locate compliant explosion-protected and associated equipment and wiring systems; ensuring equipment received is consistent with the plan; and documenting the hazardous area installation plan. It is adopted from clause 2.8 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical installation planning functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

UEEHA0005 Install explosion-protected equipment and associated apparatus and wiring systems

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine the extent of the installation	**1.1** Nature and characteristics of explosion hazards in the area are identified from the area classification and plant design documents
	1.2 In the absence of classification documents, arrangements are made with the appropriate person to have the area formally classified
	1.3 The extant gas zones, the gas groups and temperature classes or ignition temperatures are identified from the classification documents and any regulatory requirements
	1.4 The extent dust zones, minimum cloud ignition temperatures and layer ignition energy are identified from the classification documents and any regulatory requirements
	1.5 Arrangements for the supply protection/control for the hazardous area installation are determined from plant design and electrical specifications taking into account existing installation arrangement
	1.6 The location of the electrical and control equipment items and routes of wiring systems for the hazardous area are determined from the plant design and electrical specifications
2 Select and check equipment, wiring components and accessories	**2.1** Information obtained to determine the extent of the installation is applied to selecting equipment, wiring components and accessories

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	2.2	Equipment and accessories are selected for their compliance with requirements of the relevant standards for the explosive atmosphere and zone in which they are to be installed and allowing for the equipment protection level (EPL) specified in the area classification documents
	2.3	Consideration is given to the adverse effects of external influences when selecting equipment and wiring systems as required by relevant standards
	2.4	The additional requirements for explosive atmospheres are applied to selecting electrical overload and short circuit protection devices as required by relevant standards
	2.5	Manufacturer's data is referenced to ensure equipment selected is certified for the area classification zonings, groups and temperature limitations for the location in which equipment is to be installed
	2.6	Wiring systems, cables, glands and terminations are selected to comply with the associated protection types and installation requirements
	2.7	Certification documents for equipment received are checked to ensure they are consistent with the equipment marking and installation requirements
	2.8	Cables and accessories received are checked to ensure they are consistent with the markings and installation requirements previously determined
3 Document installation plan	**3.1**	Equipment location, circuit arrangement diagrams, certification details for each item of equipment, and installation schedules are included in the planning documentation
	3.2	The installation planning documentation is forwarded to the appropriate person for acceptance

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning electrical installations for hazardous areas must include reference to:

- verification dossier
- plant design and electrical installation requirements
- standards
- explosion-protected equipment manufacturer’s data

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0007 Plan electrical installations for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- determining the extent of the installation, including:
  - identifying the nature and characteristic of the explosive hazard
  - in the absence of classification documents, arranging with the appropriate person to have the area formally classified
  - determining the extent of classified areas. including:
    - gas hazards and parameters
    - dust hazards and parameters
    - any regulatory requirements
  - arranging the electrical installation for compliance with hazardous area requirements, including:
    - supply, circuit protection and controls to comply with hazardous area requirements
    - location of electrical and control equipment items
- selecting and checking equipment, wiring components and accessories, including:
  - selecting equipment compliant with:
    - requirements for the explosive atmosphere and zone in which they are to be installed
    - equipment protection level (EPL) when specified
    - required protection against the adverse effects of external influences
    - hazardous area requirements for limiting temperature rise of Ex ‘e’ equipment for normal and overload conditions
  - selecting wiring systems and cables compliant with:
    - equipment groups and protection types
    - surface temperature limitations
    - flame propagation requirements
    - requirements for Ex ‘i’ circuits
  - checking equipment, cables and accessories received to ensure they are consistent with certification, equipment marking and installation requirements
- documenting installation plan, including:

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- circuit arrangement diagrams
- equipment location
- certification details of each item of Ex equipment
- schedules of equipment, cables and connection arrangements
- forwarding installation plan report to the appropriate person for acceptance.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- information needed to select compliant equipment, including:
  - gas, vapour or dust classification in relation to the group or sub-group of the electrical equipment
  - temperature class or ignition temperature of the gas or vapour involved
  - minimum ignition temperature and energy of the combustible dust cloud
  - minimum ignition temperature of the combustible dust layer
  - external influences and ambient temperature
  - relationship between EPLs and types of protection
- requirements for the selection of equipment specified, including:
  - additional requirements for specific equipment types
  - limitation of metallic materials (e.g. cable trays, mounting plates, weather protection and enclosures) in Group I and Group II installations
- requirements for wiring systems, cables and components, including:
  - wiring systems not permitted in hazardous areas
  - wiring systems not permitted above hazardous areas
  - cables suitable for fixed wiring for:
    - Group I
    - Group II
    - Group III
  - additional requirements for wiring systems supplying protection Ex ‘d’, Ex ‘e’ and Ex ‘n’ equipment
  - wiring requirements for intrinsically safe and energy-limited circuits.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, safe work methods, installation and inspection standards, and verification dossier for the site, including:
  - area classification diagrams and documents
  - plant design specification
- electrical installation specifications, including:
  - electrical equipment to be installed
  - load requirements for each item of electrical equipment
- relevant technical standards.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0008 Design gas detection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design gas detection electrical systems and installation for a hazardous area.

It includes determining gas detection electrical system equipment parameters and evaluating these against manufacturer specifications. It also includes designing and documenting gas detection electrical system.

This unit augments formally-acquired competencies in a relevant industry. It applies to engineering design job functions at least at an engineering associate level.

Hazardous area (gas or vapour) is one in which an explosive gas atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of apparatus.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Determine gas detection electrical system parameters**	**1.1** Requirements for gas detection system are obtained or determined with relevant person/s
		1.2 System parameters for gas detection are obtained and documented from consultation with relevant person/s
		1.3 Explosion-protection requirement for gas detection equipment is determined from area classification documents
2	**Select gas detection electrical equipment**	**2.1** Manufacturer specifications and operating limitations of gas equipment are obtained and analysed in accordance with workplace requirements
		2.2 Manufacturer specifications and operating limitations are compared with the required workplace parameters for gas detection system
		2.3 Gas detection equipment is selected on compatibility with hazardous area workplace parameters and economic considerations
3	**Document gas detection equipment design**	**3.1** Proposed gas detection equipment design is checked in accordance with workplace procedures for compliance with relevant industry standards and hazardous area requirements
		3.2 Gas system specification for gas detection equipment is documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEM079A Design of gas detection systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0008 Design gas detection systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- accessing and interpreting gas detection hazardous area workplace needs and parameters
- applying relevant contingency management skills
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - risk control measures
  - workplace procedures and practices
- applying sustainable energy principles and practices
- designing gas detection systems within a hazardous area
- documenting gas detection equipment system design
- following, checking and documenting workplace procedures
- providing gas detection equipment selection options based on parameters for gas detection and economic considerations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- maintenance procedures in hazardous areas that will ensure the integrity of the explosion-protection technique, including:
  - the purpose of a maintenance schedule
  - the purpose and extent of ‘close’, ‘sample’ and ‘periodic’ inspections
  - the features of each explosion-protection techniques that should be included in a maintenance schedule
  - the impact of environmental conditions on explosion-protected equipment, including corrosion and frequency of maintenance
  - the documentation requirements for recording the maintenance process and results
  - the use of standards in determining the requirements with which the design of explosion-protected apparatus shall comply

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- techniques for the installation and maintenance of fixed gas detection equipment, including:
  - use of manufacturer instruction manuals; for example, operating instructions, adjustments procedures and operational limitations
  - installation and maintenance of standards and/or codes of practice for gas detection equipment
- location of fixed sample points or sensors, including:
  - optimal sensing
  - maintainability and ease of calibration
  - protection against environmental and mechanical damage
- gas and vapour releases, including:
  - the nature of a site
  - natural and mechanical ventilation
- common problems with fixed gas detectors
- calibration and response checking
- factors to consider in the evaluation and selection of portable and fixed gas detection equipment, including:
  - requirements for gas detection for a given situation, including:
    - sources for obtaining data on physical chemistry of the gas to be detected
    - sources for obtaining data on the conditions under which the gas may be present
    - processes of assessing the specifications of gas detection equipment against established requirements
- detecting gases and vapours, including:
  - apparatus capability and users' knowledge
  - propagation of gases - release of gas and vapours, ventilation, density, and temperature and location
  - gases to be detected and not to be detected
  - intended application
  - environmental effects
  - safety when monitoring for flammable gases where personnel could be present
  - common properties of gases and vapours - density of gases, vapours and their mixtures; effect of temperature on density; lower explosive limit (LEL) and upper explosive limit (UEL) of combustibles and toxicity
  - the differences between detecting gases and vapours - added complication of evaporation, condensation and temperature effects of vapours and their effect on propagation, calibration and detection, including sampling
- oxygen deficiency and effects on safety, including:
  - chemical reaction of oxygen with solid products
  - chemical reaction of oxygen with gaseous products
  - dilution of the air by displacement by some other gas or vapour
- measuring principles of catalytic sensors, electrochemical sensors, infrared sensors and semi-conductor sensors, including:

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  - common applications
  - limitations and safety
  - interferences of other gases with the measurement
  - poisoning of the sensor
- measuring principles of thermal conductivity sensors, flame ionisation, detectors (FID), flame temperature analysers (FTA), photo ionisation detectors (PID) and paramagnetic oxygen detectors
- selection of apparatus, including:
  - environment
  - system response delay
  - gas to be detected with respect to measurement principles
- behaviour of gas and vapour releases, including:
  - rate of release
  - density
  - temperature/pressure
- design and installation, including:
  - sensor, sampling or open path
  - location
  - site
  - environmental conditions (adverse weather, excess temperature, vibration and other mechanical interference, hosing, airborne contaminants and corrosion)
- integrity and safety, including:
  - redundancy
  - protection against loss of power supply
- commissioning and scheduled maintenance, including:
  - sample lines
  - diffusion sensor screens
  - initial gas calibration
  - adjustment of alarm set points
  - plans and records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to designing gas detection systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0009 Develop and manage periodic electrical inspection and maintenance programs for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop and manage the explosion-protection aspects for periodic electrical inspections and maintenance schemes. It includes understanding of the provisions of the applicable hazardous area standards in relation to area classification or equipment protection levels (EPLs) and selection and installation of electrical equipment; understanding of repair and reclamation of equipment; determining the frequency and grades of inspections and levels of maintenance required; and specifying and overseeing the inspection and maintenance processes to be followed and maintaining the required documentation in the verification dossier. It is adopted from clause 2.9 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to technical management and maintenance functions.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0004 Enter a classified hazardous area to undertake work related to electrical equipment

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Establish inspection and maintenance requirements	**1.1** Understanding of the provisions of hazardous area standards applicable to area classification, electrical installation design, selection and installation, and repair and reclamation of electrical equipment is applied to establishing the inspection and maintenance program
	1.2 Documentation in the verification dossier is reviewed to ascertain the extent of hazardous areas, the area classifications and the electrical installation details and, for an existing site, previous inspection schedule and maintenance program records
	1.3 The effect of external factors that may influence equipment integrity are assessed and included in establishing the types, grades and frequency inspections
2 Develop an inspection program for a hazardous area	**2.1** Inspection schedules are developed from knowledge of the extent of the hazardous area and the electrical installation, the assessment of factors influencing equipment integrity and an understanding of the requirements and recommendations of standards and equipment manufacturers
	2.2 Procedures for each grade of inspection are developed from recommendation of standards and equipment manufacturers and conditions particular to the site
	2.3 A documentation system is developed for reporting inspection activities and identifying non-compliance defects and recommendations for maintenance
	2.4 WHS/OHS policies and procedures are incorporated into

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		the inspection and resulting maintenance program
3 Implement and evaluate the inspection and maintenance program	**3.1**	Qualifications of inspectors and maintenance personnel are reviewed to ensure they are currently competent to do the work
	3.2	Periodic and sample inspection reports are used to develop maintenance programs and identify the need to revise the extent and frequency of inspections
	3.3	Maintenance programs are established within the limits permitted for remedial maintenance in hazardous areas
	3.4	Procedures are established for equipment identified as requiring repair or overhaul to be removed from service and sent to an accredited facility
	3.5	Reports and other documentation related to the inspection and maintenance program activities are retained in the site verification dossier

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0009 Develop and manage periodic electrical inspection and maintenance programs for hazardous areas

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- determining inspection requirements, including:
  - reviewing all documentation held in the verification dossier
  - assessing the effect of factors that may influence equipment integrity
- developing an inspection program for a given hazardous area, including
  - developing inspection schedules based on information gathered from the verification dossier, factors that may influence equipment integrity, requirements of relevant standards and any previous inspection results
  - developing procedures for each grade of inspection based on the recommendation of standards and equipment manufacturers and conditions particular to the site
  - developing or reviewing the documentation systems for reporting inspection activities and identifying non-compliance defects and recommendations for maintenance
  - establishing or improving work health and safety (WHS)/occupational health and safety (OHS) procedures and safe work methods for inspection and maintenance activities
- implementing and evaluating the inspection program and the resulting maintenance required, including:
  - reviewing qualification of inspection and maintenance persons to ensure they are currently competent
  - developing a maintenance program from periodic and sample inspection reports, including procedures for dealing with equipment that may require repair or overhaul
  - evaluating the need to revise the extent and frequency of inspections from analysis of information in the inspection reports
  - ensuring all inspection and maintenance documents are retained in the verification dossier
  - establishing procedures for remedial maintenance and equipment repair and overhaul.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of

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the requirements of the elements and performance criteria and include knowledge of:

- area classification, including:
  - general principles and objectives
  - area classification procedures, including:
    - sources and grades of release
    - type and extent of zones
    - dust layer hazards
  - application of equipment protection levels (EPLs)
- required inspection documentation encompassing:
  - site-specific documents, including:
    - area classification and, where included, EPL for each location
    - records of explosion-protected equipment to be maintained in accordance with its type of protection
    - previous inspection records
  - compliance standards for equipment, electrical installation, design and selection and inspection and maintenance
- inspection requirements, including:
  - grades of inspection and types of inspection
  - aspects to consider in establishing an inspection schedule
  - inspection schedule requirements
  - documentation of the results of scheduled inspections
  - WHS/OHS policy and safe work methods, including isolation of equipment within the hazardous area
- maintenance requirements, including:
  - aspects of equipment subject to maintenance
  - limits of remedial maintenance within hazardous areas
  - requirements for repair, overhaul and reclamation of equipment
  - defects and remedial recommendations identified in schedule inspections.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- applicable documentation, including:
    - WHS/OHS policy and procedures for the site
    - verification dossier for the site that includes the following:
        - area classification documents
        - plant design specifications
        - 'as-installed' electrical equipment location and distribution drawing
        - process diagrams
        - certification documents for all installed equipment
        - relevant technical standards
        - inspection reports and maintenance records.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0010 Supervise repair and overhaul of explosion-protected equipment type Group III ('t')

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected equipment type Group III ('t'). It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated as the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazardous

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/ overhaul required	**2.1** Safe work methods are applied to measurements, tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be completed is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for completing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type, standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and applicable to an equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available is included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected equipment type Group III ('t') must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0010 Supervise repair and overhaul of explosion-protected equipment type Group III ('t')

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work, including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul, including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records, including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements). including:
  - common requirements for repair and overhaul work of explosion-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with explosion-protection type special ‘s’
- repair and overhaul of explosive-protected equipment type Group III enclosure ‘t’, including:
  - additional requirements for the repair and overhaul of equipment Group III with type of protection Ex ‘t’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - Ex ‘t’ (dip) motors
    - Ex ‘t’ (dip) enclosures
    - electrical equipment installed within Ex ‘t’ (dip) enclosures
- repair and overhaul of explosive-protected equipment type non-sparking ‘n’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘n’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ’n’ enclosures electrical equipment installed within Ex ‘n’ enclosures
- repair and overhaul of explosive-protected equipment type pressurisation ‘pD’, including:

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- additional requirements for the repair and overhaul of equipment with type of protection Ex ‘pD’ encompassing:
  - application
  - repair and overhaul requirements
  - reclamation
  - alterations and modifications
- repair and overhaul of explosive-protected equipment type encapsulation ‘m’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘m’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type oil-filled 'o', including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘o’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type powder-filled ‘q’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘q’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosion-protected equipment
- relevant equipment standards and manufacturer's data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0011 Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected equipment type flameproof (Ex d). It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and, completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated as the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/overhaul required	**2.1** Safe work methods are applied to measurements, tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be completed is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for completing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and applicable to an equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available is included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected equipment type flameproof (Ex d) must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0011 Supervise repair and overhaul of explosion-protected equipment type flameproof (Ex d)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work, including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul, including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records, including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements), including:
  - common requirements for repair and overhaul work of explosive-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with type of protection special ‘s’
- repair and overhaul of explosive-protected equipment type flameproof ‘d’, including:
  - examination procedures of Ex ‘d’ equipment submitted for repair and overhaul encompassing:
    - identifying key components and relevant physical parameters
    - identify indications of component damage
    - testing and inspection required to establish relevant physical parameters
    - comparison of physical parameters with equipment documentation
  - additional requirements for the repair and overhaul work of equipment with type of protection Ex ‘d’ encompassing the following:
    - application
    - repair and overhaul requirements
    - reclamation of equipment
    - alterations and modifications of equipment
  - requirements for measurements in Ex ‘d’ equipment during overhaul, repair and reclamation encompassing:
    - general requirements
    - guidance on tolerances to be achieved at overhaul Groups I, II and III
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ‘d’ motors
    - Ex ‘d’ enclosures
    - electrical equipment installed within a Ex ‘d’ enclosures

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    - corrosion or surface indentation tolerance
- repair and overhaul of explosive-protected equipment type non-sparking ‘n’, including:
    - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘n’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
    - evaluation procedures and parameters encompassing:
        - general requirements
        - Ex ’n’ enclosures
        - electrical equipment installed within Ex ‘n’ enclosures
- repair and overhaul of explosive-protected equipment type pressurisation ‘pD’ including:
    - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘pD’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type encapsulation ‘m’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘m’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type oil-filled, ‘o’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘o’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type powder-filled ‘q’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘q’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosive-protected equipment
- relevant equipment standards and manufacturer’s data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0012 Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected equipment type increased safety (Ex 'e'). It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated as the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/overhaul required	**2.1** Safe work methods are applied to measurements, tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be completed is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for doing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and applicable to the equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available is included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected equipment type increased safety (Ex e) must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0012 Supervise repair and overhaul of explosion-protected equipment type increased safety (Ex e)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work, including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul, including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records, including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements), including:
  - common requirements for repair and overhaul work of explosive-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with type of protection special ‘s’
- repair and overhaul of explosive-protected equipment type increased safety ‘e’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘e’ encompassing the following:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ‘e’ motors
    - Ex ‘e’ enclosures
    - electrical equipment installed within ex ‘e’ enclosures
- repair and overhaul of explosive-protected equipment type non-sparking ‘n’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘n’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ’n’ enclosures

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    - electrical equipment installed within Ex ‘n’ enclosures
- repair and overhaul of explosive-protected equipment type pressurisation ‘pD’, including:
    - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘pD’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type encapsulation ‘m’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘m’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type oil-filled ‘o’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘o’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications
- repair and overhaul of explosive-protected equipment type powder-filled ‘q’, including:
    - requirements for the repair and overhaul of equipment with type of protection Ex ‘q’ encompassing:
        - application
        - repair and overhaul requirements
        - reclamation
        - alterations and modifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosive-protected equipment
- relevant equipment standards and manufacturer's data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0013 Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i). It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and, completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated as the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/ overhaul required	**2.1** Safe work methods are applied to measurements, tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be completed is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for completing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and applicable to an equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available is included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i) must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0013 Supervise repair and overhaul of explosion-protected equipment type intrinsically safe (Ex i)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work, including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul, including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records, including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements), including:
  - common requirements for repair and overhaul work of explosive-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with type of protection special ‘s’
- repair and overhaul of explosive-protected equipment type intrinsically safe ‘i’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘i’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - technical aspects of the equipment
    - service facilities’ established requirements
  - manufacturer’s guidance to service facilities and users
- repair and overhaul of explosive-protected equipment type non-sparking ‘n’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘n’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ’n’ enclosures
    - electrical equipment installed within Ex ‘n’ enclosures

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- repair and overhaul of explosive-protected equipment type pressurisation ‘pD’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘pD’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type encapsulation ‘m’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘m’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type oil-filled ‘o’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘o’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type powder-filled ‘q’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘q’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosive-protected equipment
- relevant equipment standards and manufacturer's data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0014 Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected equipment type pressurised (Ex p). It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/overhaul required	**2.1** Safe work methods are applied to measurements, tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be done is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for completing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and applicable to an equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available is included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected equipment type pressurised (Ex p) must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0014 Supervise repair and overhaul of explosion-protected equipment type pressurised (Ex p)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work/ including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul/ including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records/ including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements). including:
  - common requirements for repair and overhaul work of explosive-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with type of protection special ‘s’
- repair and overhaul of explosive-protected equipment type pressurised ‘p’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘p’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - testing requirements and methods
    - service facilities’ established requirements
- repair and overhaul of explosive-protected equipment type non-sparking ‘n’, including:
  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘n’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
  - evaluation procedures and parameters encompassing:
    - general requirements
    - Ex ’n’ enclosures
    - electrical equipment installed within Ex ‘n’ enclosures
- repair and overhaul of explosive-protected equipment type pressurisation ‘pD’, including:

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  - additional requirements for the repair and overhaul of equipment with type of protection Ex ‘pD’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type encapsulation ‘m’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘m’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type oil-filled ‘o’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘o’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications
- repair and overhaul of explosive-protected equipment type powder-filled ‘q’, including:
  - requirements for the repair and overhaul of equipment with type of protection Ex ‘q’ encompassing:
    - application
    - repair and overhaul requirements
    - reclamation
    - alterations and modifications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosive-protected equipment
- relevant equipment standards and manufacturer's data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEHA0015 Supervise repair and overhaul of explosion-protected rotating machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan and supervise the repair and overhaul of explosion-protected rotating machines. It includes liaising with equipment users to establish and document the level of work required; writing specifications for the repair and overhaul and arranging for repairs to be carried out; verifying compliance of repaired and overhauled equipment; and, completing all the required documentation. It is adopted from clause 2.22 of AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA).

This unit applies to electrical equipment repair workshop supervisory job function, designated as the ‘responsible person’.

Site-specific work permits maybe required to work in the hazardous environment. In addition, other permits may be required, such as confined space and to operate specific pieces of equipment such as elevated work platforms (EWPs) in various jurisdictions.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEHA0003 Determine the explosion-protection requirements to meet a specified classified hazardous area

and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEEEL0028 Conduct compliance and functional verification of electrical apparatus and existing circuits

or

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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Competency Field

Hazards

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for repair and overhaul of equipment	**1.1** Repair facility quality assurance system is obtained, interpreted and applied
	1.2 Instructions on repair and/or overhaul are received and expected outcomes of the work confirmed with the user
	1.3 All documentation relevant to the equipment repair and/or overhaul is obtained, interpreted and applied
	1.4 Where adequate relevant equipment information is not available, steps taken to source such information are documented
	1.5 Agreement is made with the user for the repair and/or overhaul of Group II and III equipment to be completed in accordance with standards where adequate documentation is not available
	1.6 The common requirements for equipment repair and overhaul are ascertained from relevant standards and regulations and applied to the preparation for the work only where this arrangement is permitted
2 Establish the level of repair/overhaul required	**2.1** Safe work methods are applied to measurements, and tests and inspections carried out on the equipment to establish the extent of repair and/or overhaul
	2.2 The requirements, evaluation procedures and parameters of the type of equipment to be repaired and/or overhauled are ascertained from relevant standards and regulations and applied to establishing the extent of the work

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	2.3	Measurement devices and instruments are maintained and calibrated in accordance with recognised practices
	2.4	The extent of work to be completed is established from measurements, tolerances and evaluation procedures and their correspondence with equipment documentation and the requirements of standards
	2.5	Specifications and instructions for the repair and/or overhaul work are documented ensuring compliance with original documentation, standards and user instructions
3 Arrange repair and overhaul work	**3.1**	Arrangements are made for the repair and overhaul work to be completed in accordance with the specification and instructions, by an operative with the competencies specified in standards
	3.2	A copy of repair and/or overhaul specifications and instructions is provided to the operative responsible for completing the work
4 Verify that equipment complies with original certification	**4.1**	Scope and level of testing and measurements required to verify that overhauled and/or repaired equipment complies with original certification is determined in accordance with manufacturers' documentation and standards requirements as applicable to an equipment group
	4.2	Verification tests and measurements are arranged, conducted and documented in accordance with equipment type, standards and instruction manuals
	4.3	Results of verification tests and measurements are reviewed to ascertain whether they comply with original equipment documentation and/or agreement with the user
	4.4	Actions are taken to rectify any non-compliance identified through the verification tests and measurements
5 Document repair and overhaul work	**5.1**	Equipment is marked to show it has been repaired and/or overhauled in accordance with standards and equipment group
	5.2	Job report of the completed repair and/or overhaul is prepared in accordance with standards and submitted to the user for inclusion in their verification dossier

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5.3 Repair facility records are updated to include the job record in accordance with standards and quality system

5.4 The steps taken to obtain the certificate documents where adequate equipment documentation was not available are included in the repair facility records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Supervising repair and overhaul of explosion-protected rotating machines must:	• apply to the supervision of overhaul and repair of explosion-protected equipment • be carried out under an approved quality management system • include access to all relevant standards and liaison with end-users

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEHA0015 Supervise repair and overhaul of explosion-protected rotating machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- preparing for repair and overhaul work of equipment, including:
  - following quality assurance system procedures
  - gathering required documentation
- establishing the level of repair and overhaul required, including:
  - following safe work methods
  - examining equipment submitted for repair and overhaul using appropriately maintained measuring devices and instruments
  - documenting the specification for the repair and overhaul
- arranging repair and overhaul work, including:
  - selecting appropriately competent operatives to carry out repair and/or overhaul, including reclamation activities
  - providing operative with the repair and/or overhaul specifications
- verifying that equipment complies with original certification, including:
  - choosing the scope and level of tests and measurements required to verify whether the repaired and/or overhauled equipment complies with original documented requirements
  - arranging for verification of compliance tests and measurements to be carried out
  - reviewing results of verification tests and taking actions to rectify any non-compliance identified by the verification tests and measurements
- documenting repair and overhaul work, including:
  - marking equipment in accordance with standard requirements to show that equipment has been repaired
  - preparing job report of the completed repair and overhaul, including all items specified by standards and submitted to the user
  - updating the repair and overhaul undertaken in the repair facility records, including steps taken to obtain equipment documentation as required by standards.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- repair and overhaul of explosion-protected equipment (common requirements), including:
  - common requirements for repair and overhaul work of explosive-protected equipment encompassing:
    - equipment with documentation and without documentation
    - statutory requirements for repair facility and user
    - instructions for the user
    - instructions for the repair facility
  - identification of repaired equipment by marking encompassing:
    - marking information
    - symbols in accordance with standards requirements
    - other situations
  - requirements for the repair and overhaul of equipment with protection level (EPL) Ga
  - limitations and requirements for the repair and overhaul of equipment with explosive-protection type special Ex ‘s’
- explosion-protected rotating machines, including:
  - requirements for the repair and overhaul of explosive-protection type flameproof Ex ‘d’ for rotating machines encompassing:
    - instructions for the repair facility - rotating machines
    - winding data and repair parameters
    - embedded winding temperature sensors
    - machine frames/enclosures and flameproof joints
    - repair of rotors
    - winding tests conducted after repair
    - machine tests after repair/overhaul
    - auxiliary equipment
    - documentation of repair/overhaul
  - requirements for the repair and overhaul of explosive-protection type increased safety Ex ‘e’ for rotating machines encompassing:
    - instructions for the repair facility - rotating machines
    - winding data and repair parameters
    - embedded winding temperature sensors
    - machine frames/enclosures, clearances and terminations
    - repair of rotors
    - winding tests conducted after repair
    - machine tests after repair/overhaul
    - documentation of repair/overhaul

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- evaluation procedures and parameters encompassing overhaul of equipment protected by enclosures Ex ‘t’ (dip) motors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate tools and testing devices and personal protective equipment (PPE) currently used in industry
- safe work methods
- a certified quality management system
- documentation and record systems required of a workshop certified to undertake repair and overhaul of explosive-protected equipment
- relevant equipment standards and manufacturer’s data
- equipment to be repaired/overhauled.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0001 Analyse complex electronic circuits controlling fluids

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse complex electronic circuits that integrate with the operation of fluid control systems on machinery.

It includes working safely, applying knowledge of equipment and electronic and fluid control circuit operations, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical problems are those encountered in meeting performance requirements and compliance standards, revising machine operating parameters and dealing with function.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse complex circuits controlling fluids	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3	Scope of circuit analysis is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with person/s involved in the work
	1.5	Strategies are determined, solution developed and implemented in accordance with workplace procedures
2 Undertake analysis of complex circuits controlling fluids	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Control concepts and electro-fluid control circuits are applied in developing analytical solutions to machine parameters/faults and operation
	2.3	Parameter specifications and performance requirements in relation to each circuit are obtained in accordance with workplace procedures and relevant industry standards
	2.4	Circuit parameters and specifications are analysed to provide the most effective solution/s in accordance with workplace procedures
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and workplace policies and procedures
	2.6	Quality of work is monitored in accordance with performance agreement and/or workplace procedures or relevant industry standards
3 Document and report result/s of circuit analysis and action/s taken	**3.1**	Solutions to circuit analysis are inspected and tested to determine their effectiveness and modified as required
	3.2	Analysis is documented, including details of fault findings, calculations and assumptions
	3.3	Analysis is reported to appropriate person/s to determine suitable action/s to be taken based on fault-findings analysis

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3.4 Justification for analysis findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project records in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI127A Analyse complex electronic circuits controlling fluids.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0001 Analyse complex electronic circuits controlling fluids

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- analysing electronic circuits controlling fluids
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed
- documenting justification of actions to be implemented in accordance with relevant industry standards
- forming effective strategies for analysing circuit performance
- inspecting and testing the results of the analysis
- obtaining circuit control parameters, specifications and performance requirements appropriate to each situation
- understanding the operation of electronic and fluid controls
- documenting and reporting on results of circuit analysis and actions taken
- preparing to analyse complex circuits controlling fluids.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- control system functions
- current industry practices and technologies
- electronic control of fluid processes
- identification of process characteristics from process test data

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- interfacing electronics with hydraulic and pneumatic devices and systems
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant problem-solving techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- selection of proportional valves to suit fluid applications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to analysing complex electronic circuits controlling fluids
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0002 Assemble, enter and verify operating instructions in microprocessor equipped devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble, enter and verify operating instructions in microprocessor equipped device with simple inbuilt programming functions ensuring the device operates as intended.

It includes working safely, checking device installation, following written and oral instructions and workplace procedures, and completing necessary documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble and enter operating instructions	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 Hazards are identified, risks assessed and control

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		measures implemented
	1.3	Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from supervisor
	1.4	Supervisor/customers are consulted to determine which functions of the device are used and the parameter of each
	1.5	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
	1.6	Device installation is checked for compliance with job specification and regulations where required
2 Assemble and enter operating instructions	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Required status of each function of the device is entered and their parameters set in accordance with manufacturer programming instructions
	2.4	Entered data is checked in accordance with specifications stated by work supervisor/customer
	2.5	Unplanned situations are responded to in accordance with workplace procedures and approval of an authorised person/s
3 Test device operation and report	**3.1**	Device operation is tested in accordance with workplace procedures
	3.2	Operating anomalies are identified and corrected in accordance with workplace procedures
	3.3	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.4	Worksite is cleaned and made safe in accordance with workplace procedures
	3.5	Work completion is documented and appropriate person/s notified in accordance with workplace

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procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling, entering and verifying operating instructions must include at least two of the following types of microprocessor equipped devices with inbuilt icon based programmable functions:	• programmable relays • timers • temperature controllers • detection devices for security and fire • programmable logic controller (PLC)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI116A Assemble, enter and verify operating instructions in microprocessor equipped devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0002 Assemble, enter and verify operating instructions in microprocessor equipped devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing risk control measures
  - applying safe working practices
- completing required documentation
- assembling, entering and verifying operating instructions in basic microprocessor equipped devices
- identifying non-compliance conditions of device installation
- isolating electrical components in accordance with workplace procedures
- correcting programming anomalies
- testing, entering functions, verifying device operation parameters correctly and reporting
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- using required operating functions and parameters.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- digital controllers, including:
  - types
  - block diagram of controller
  - applications
  - terms
- controller input and output equipment, including:
  - input sensors (transducers)

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    - current loop concepts
    - output current and voltage ratings
    - supplementary solid-state relays/contactors
- installation of microprocessor equipped device/s, including:
    - types of input sensors
    - wiring
    - mounting techniques
    - terminal types
    - output current protection
- configuration and digital controller set-up, including:
    - manufacturer's data
    - testing
- microprocessor equipped devices including simple programmable relays, timers, temperature controllers, switches and basic detection devices for security and fire systems
- operating instructions in basic microprocessor equipped devices
- function
- equipment and tools relating to testing of microprocessor equipped devices
- relevant workplace documentation
- relevant workplace policies and procedures
- risk control measures, including safe working practices
- techniques for resolving programming anomalies.
-

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0003 Assist in commissioning process and instrumentation control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assist in commissioning of process control systems.

It includes working safely and with others, complying with requirements, applying knowledge of process and control components, pre-commissioning tests, checking and adjusting components and controls to ensure efficient and safe operation and completing commissioning documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

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UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assist in commissioning process control systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Commissioning plan is reviewed with relevant team members to ensure commissioning role/s of members are identified and ensure work is coordinated effectively in accordance with workplace procedures
	1.5 Measurement parameters are identified with team in accordance with workplace procedures, process requirements and manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with relevant industry standards
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and

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		workplace procedures
	1.9	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Assist in commissioning process control systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Commissioning testing/measuring devices are connected and set up in accordance with relevant industry standards for control system and work instructions
	2.3	Process instruments and apparatus are set up and adjusted in accordance with relevant industry standards, process control requirements, equipment manufacturer instructions and work instructions
	2.4	Adjustments are made to provide optimum transmission/reception performance in accordance with relevant industry standards
	2.5	Decisions for dealing with unplanned situations are made from discussions with relevant person/s and/or job specifications
	2.6	Methods for dealing with unplanned situations are selected in accordance with WHS/OHS requirements and job specifications
	2.7	Commissioning assistance is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report commissioning activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Process control systems incorporating closed loop control and digital and analogue elements must include at least five of the following:

- interacting control functions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI122A Assist in commissioning process and instrumentation control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0003 Assist in commissioning process and instrumentation control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- assisting in commissioning process control systems
- carrying out commissioning assistance without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- checking and isolating circuits
- checking preparatory work to ensure no damage has occurred
- connecting and setting up commissioning testing/measuring devices in accordance with relevant industry standards for particular control system and work instructions
- dealing with unplanned situations with decisions from discussions with relevant person/s and/or job specifications
- determining need to test and measure live work
- documenting adjustment settings in accordance with workplace procedures
- identifying measurement parameters by reviewing process requirements and equipment manufacturer instructions
- identifying roles of each commission team member
- making adjustments to provide optimum transmission/reception performance
- obtaining tools, equipment and testing devices required for work
- preparing to assist in commissioning process control systems
- setting up and adjusting process instruments and apparatus in accordance with relevant industry standards for process control, equipment manufacturer instructions and work instructions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- isolation procedures
- problem-solving techniques
- process instruments and apparatus
- relevant commissioning process, including:
  - commissioning planning and documentation
  - procedures for commissioning instrumentation
  - purpose and importance of documentation
  - purpose of commissioning
- relevant industry standards for control system
- relevant manufacturer specifications and operating instructions
- relevant measurement parameters
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing/measuring device
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - commissioning plan
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to assisting in commissioning process control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0004 Calibrate, adjust and test measuring instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to calibrate, adjust and test measuring instruments.

It includes working safely, following calibration and adjustment procedures, applying knowledge of parameters to be measured, testing and reporting.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to calibrate, adjust and test measuring	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a

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instruments		given work area are identified, obtained and applied
	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures implemented
	1.4	Relevant person/s is consulted to ensure work is coordinated effectively with others involved on worksite
	1.5	Instrument parameters are identified by reviewing process specifications and manufacturer instructions
	1.6	Tools, equipment and testing devices needed for the work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Calibrate, adjust and test measuring instruments	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Calibration testing/measuring arrangement is connected and arranged in accordance with manufacturer instructions and certification requirements for relevant instrument
	2.3	Factors effecting instrument error are determined and recorded in the calibration process in accordance with manufacturer specifications and relevant industry standards
	2.4	Instrument set-point is determined and error adjustments noted in accordance with manufacturer specifications and relevant industry standards
	2.5	Instrument is tested and adjustment made, as required, to ensure instrument meets calibration requirements
	2.6	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Quality checks of process output are undertaken to ensure control loop is tuned in accordance with workplace procedures

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	2.9	Calibration is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report calibration activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Calibration is documented in accordance with certification requirements and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Calibrating, adjusting and testing measuring instruments must include at least one of the following:	• electrical/electronic • non-electrical instrument

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI117A Calibrate, adjust and test measuring instruments.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0004 Calibrate, adjust and test measuring instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- calibrating instrument to measure within specified tolerance
- carrying out calibration without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- connecting calibration testing/measuring arrangement in accordance with manufacturer instructions and certification requirements for instrument
- dealing with unplanned situations safely and in discussion with relevant person/s
- determining factors effecting instrument error
- documenting calibration with certification requirements
- identifying instrument parameters
- obtaining tools, equipment and testing devices
- preparing to calibrate, adjust and test measuring instruments
- quality checking of process outputs in accordance of workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant calibration techniques
- relevant fundamentals of calibration
- relevant industry standards
- relevant instrument parameters and tolerance
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions

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- relevant measurement standards applicable to scientific instruments
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including certification
- relevant workplace quality, instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to calibrating and testing measuring instruments
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0005 Configure and maintain industrial control system networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to configure and maintain communication services on an industrial control system network.

It includes industrial control network topology and protocols, configuring data links, bus monitoring and system management and access, network testing and documenting system settings.

This unit applies to all aspects of electrotechnology – engineering applications only. For general competencies related to information technology (IT) refer to the latest endorsed ICT Information and Communications Technology Training Package.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to configure industrial control system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a

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networks		given work area are identified, obtained and applied
	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of the industrial control system and network is established from control system specifications and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work
	1.5	Network operating system versions and updates needed to configure and maintain the network are obtained in accordance with workplace procedures and checked against job requirements
2 Configure and maintain industrial control system networks	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Control application network components are installed, upgraded and configured in accordance with design instructions and network requirements
	2.3	Devices desktop environment, network protocols and services and system security are implemented in accordance with network requirements
	2.4	Access to control data and resources is configured within the limitations specified for each relevant network user
	2.5	Network malfunctions are identified and rectified using logical fault-finding techniques of control devices, storage network protocols, connections and services and system security configuration processes
	2.6	Network performance and reliability is monitored and optimised in accordance with workplace procedures
	2.7	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.8	Network administration is carried out efficiently, without waste of materials and energy or damage to apparatus, the surrounding environment or other

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		services
3 Document network configuration and maintenance activities	**3.1**	Written justification is documented detailing network maintenance and upgrade requirements and relevant person/s notified in accordance with workplace procedures
	3.2	Network maintenance documentation is maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Configuring and maintaining an industrial control system network must include the following:	• at least two programable controllers • at least one human-machine interface (HMI)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI157A Configure and maintain industrial control system networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0005 Configure and maintain industrial control system networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- configuring and maintaining industrial control system networks
- configuring access to control data and resources for each user
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting network configuration and maintenance activities
- determining industrial control system and network requirements and operating system versions and updates
- identifying network malfunctions/faults
- installing, upgrading and configuring control application network components correctly
- rectifying network malfunctions/faults in accordance with workplace procedures
- documenting control system network configuration and maintenance requirements
- planning and preparing to configure and maintain industrial control system networks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- bus monitor, including capturing and filtering
- control system networks interface
- data link layer
- field bus message specification
- high-speed ethernet and protocols
- industrial control systems networks
- network topology, including nodes and connecting lines

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- open and common proprietary control system networks models (layers) and protocols
- purpose and application of control system networks systems
- relevant job safety assessments or risk mitigation processes
- relevant industry standards and protocols
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to configuring and maintaining industrial control system networks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0006 Design and configure Human-Machine Interface (HMI) networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and configure human-machine interface (HMI) networks.

It includes applying safe working practices; designing, installing and configuring controllers and devices; monitoring system operations; diagnosing malfunctions and faults; and documenting development activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Select and design HMI control system network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and

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		control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of HMI control system network is determined from network specifications/design brief and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled specifications/design brief timelines in consultation with person/s involved in the work
	1.5	Management tools and software are selected based on specified requirements and performance standards
	1.6	Strategies are implemented to ensure network development is carried out efficiently
2 Install, configure and manage HMI control system network	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Network infrastructure components are installed and configured in accordance with industry standards and variants as specified for the network
	2.3	Structural components of directory services are installed and configured in accordance with industry standards and variants as specified for the network
	2.4	Management components of network control system are configured in accordance with industry standards and requirements specified for the network
	2.5	Security components of network control system are created in accordance with industry standards and requirements specified for the network
	2.6	Network malfunctions/faults are identified and rectified using logical problem-solving techniques of complex network control system infrastructure
	2.7	Network is monitored and solutions are developed to optimise network performance and reliability in accordance with workplace procedures
	2.9	Security events are analysed and actions taken in accordance with workplace policies and protocols
	2.10	Methods for dealing with unplanned issues/problems are analysed to provide the most effective solutions in

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		accordance with workplace procedures
	2.11	Quality of work is monitored in accordance with performance agreement/specifications and/or workplace procedures or industry standards
3 Report HMI network administration activities	**3.1**	Written justification is produced for HMI network services development activities and relevant person/s notified in accordance with workplace procedures
	3.2	Network service development records are maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing and configuring HMI networks must include at least the following:

- controllers and devices installation and configuration
- development activities documentation
- malfunctions and faults diagnostics
- operation of distributive and central control system networks monitoring and maintenance
- safe working practices
- system operations monitoring

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI153A Design and configure Human-Machine Interface (HMI) networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0006 Design and configure Human-Machine Interface (HMI) networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- configuring management components of human-machine interface (HMI) network services
- creating security components of HMI network services
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing solutions to optimise network performance
- documenting HMI network services development activities
- establishing network services to be developed
- identifying and rectifying HMI network malfunctions/faults
- installing and configuring network infrastructure components
- installing and configuring structural components of directory services
- installing, configuring and managing HMI control system networks
- preparing to design control system networks
- reporting network administration activities in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques and troubleshooting remote access including remote access policy, configuration of remote access profile, virtual private network (VPN), multi-link connection, routing and remote access for dynamic host configuration protocol (DHCP)

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- control system networks interface
- DHCP
- HMI control system networks
- installation, configuring and troubleshooting of internet protocol (IP) routing protocols including updating routing tables and implementing demand-dial routing
- internet naming services in a network
- IP routing, including border routing, internal routing and IP routing protocols
- network address translation (NAT)
- network infrastructure
- network protocols
- open and common proprietary control system networks models (layers) and protocols, including CANopen, ControlNet, devicenet, ethernet, foundation fieldbus, interbus, modbus and pofibus
- purpose and application of HMI control system networks systems
- relevant certificate services
- relevant domain name service (DNS)
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- remote access security including authentication protocols, encryption protocols and access policy.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to designing and configuring HMI networks
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0007 Design and use advanced programming tools, PC networks and HMI Interfacing

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design and use advanced programming tools, personal computer (PC) networks and human-machine interface (HMI) in the design of computer applications for control processes.

It includes preparing, developing and obtaining design approval for computer applications by designing control systems, programmable logic controllers (PLCs), and supervisory control and data acquisition (SCADA) systems.

It also includes control programming methods, developing alternative design schemes based on design brief and customer relations and documenting design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a

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computer applications		given work area are identified, obtained and applied
	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of proposed control system is determined from the design brief and in consultation with relevant person/s
	1.4	Design development work is planned to meet scheduled design brief timelines in consultation with person/s involved on the worksite
2 Develop computer applications design for control process	**2.1**	Control devices, control systems and control programming methods are applied to the computer applications design
	2.2	Alternative concepts for the design are tested in accordance with the requirements outlined in the design brief
	2.3	Safety specifications and budget constraints are considered in the design process
	2.4	System design draft is checked for compliance with the design brief, relevant industry standards and regulatory requirements
	2.5	System design is documented for submission to relevant person/s for approval
	2.6	Solutions to unplanned situation are dealt with in a manner that minimises risk to personnel and equipment in accordance with workplace policies and procedures
3 Obtain design approval for computer applications	**3.1**	System design is presented and explained to client representative and/or relevant person/s
	3.2	Requests for alterations to design are negotiated with relevant person/s in accordance with workplace policy
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with performance agreement/specifications and/or workplace procedures or industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Designing a computer-based control system must include at least two of the following:	• configure and test a PLC peer to peer network • configure and test a PLC hierarchical network • configure and test a PLC field bus style network • develop PLC code using a structured text programming tool • develop PLC code using a sequential function chart programming tool • design a simple HMI interface using a typical touch screen device • use system diagnostics to fault find hardware/software issues • program and test a proportional integral derivative (PID) functional control/program block

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI154A Design and use advanced programming tools PC networks and HMI Interfacing.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0007 Design and use advanced programming tools, PC networks and HMI Interfacing

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- designing a programmable logic controller (PLC) computer-based control system
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing computer applications design
- obtaining design approval for computer applications
- planning and preparing to design of computer application for control processes
- testing design concepts by real or virtual prototyping, where it cannot be shown easily by other means, and confirming that particular aspects of the design meet specified requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- alternative/enhancing programming methods
- bus monitor, including capturing and filtering
- communications methods and requirements, including:
  - common protocols and interface standards
  - communication mediums
  - network types and topologies
  - peer to peer networks
  - remote input/output (I/O)
  - requirements when networking/interfacing PLCs
- high-speed ethernet specification/requirements
- intelligent terminals/graphic interfaces installation and communication requirements

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- proportional integral derivative (PID) computer-based control system and system applications
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant specialist instructions, including interrupt driven applications, high-speed counters and positional encoders
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system diagnostics techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to design a computer-based control system
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0008 Design electronic control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design electronic control systems.

It includes working safely, following design brief, applying knowledge of digital and analogue devices, interpreting device specifications, constructing prototypes, using appropriate development software, applying programming techniques, testing developed system prototype operation and documenting design and development work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0018 Diagnose and rectify faults in digital controls systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Electrical Pathway Group

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UEEEL0003 Arrange circuits, control and protection for electrical installations
UEEEL0008 Evaluate and modify low voltage heating equipment and controls
UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls
UEEEL0010 Evaluate and modify low voltage socket outlets circuits
UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits
UEEEL0023 Terminate cables, cords and accessories for low voltage circuits
UEEEL0024 Test and connect alternating current (a.c.) rotating machines
UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group
UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits
UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals
UEEIC0041 Solve problems in pressure measurement components and systems
UEEIC0038 Solve problems in density/level measurement components and systems
UEEIC0039 Solve problems in flow measurement components and systems
UEEIC0043 Solve problems in temperature measurement components and systems
UEEIC0029 Set up and adjust PID control loops
UEEIC0030 Set up and adjust advanced PID process control loops
UEEIC0048 Verify compliance and functionality of instrumentation and control installations
UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify electronic control	**1.1** Work health and safety (WHS)/occupational health and

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system requirements		safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of the proposed electronic control system is determined from design brief in consultation with appropriate person/s
	1.4	Design of electronic control system development work is planned to meet scheduled timelines in consultation with person/s involved on the worksite
	1.5	Materials and devices/components required for work are determined on compatibility of their specifications with control system requirements and project budget constraints
2 Design electronic control system	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Digital and analogue device elements used in control systems and relevant industry standards are applied to the design specification
	2.3	Alternative design/s is considered based on the design brief
	2.4	Safety, functional and budget considerations are incorporated in the design specification
	2.5	Prototype devices and circuits are constructed, programmed and tested for compliance with design brief and regulatory requirements
	2.6	Prototype faults are rectified and retested to ensure effective operation of design
	2.7	Control system design specifications are documented for submission to appropriate person/s for approval
	2.8	Solutions to unplanned situations are implemented in accordance with workplace policy
3 Obtain approval for electronic control system	**3.1**	Control system design is presented and explained to client representative and/or relevant person/s
	3.2	Alterations to design are negotiated with relevant

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person/s within the constraints of workplace policy

3.3 Final system design is documented and approval obtained from appropriate person/s

3.4 Quality of work is monitored against performance agreement and/or workplace or relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing electronic control systems must include at least the following:

- one closed loop control system based on digital and analogue elements
- one open loop control systems based on digital and analogue elements
- a combination of inputs and outputs

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI123A Design electronic control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0008 Design electronic control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- designing electronic control system
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing outlines of alternative designs
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- identifying and planning to design electronic control systems
- obtaining design approval for electronic control systems design.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- designing control systems
- control systems, including:
  - process controllers, programmable controllers and personal computers
  - control peripherals and suitable control
- purpose built microprocessor controller with multiple inputs resulting in different or changed outputs
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to designing electronic control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0009 Develop an electrical integrated system interface for access through a touch screen

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop an electrical integrated system interface for access through a touch screen.

It includes preparing and developing an integrated system touch screen interface. It also includes backing up, transferring and testing touch screen interface integrated system, working with customers to determine required control parameters, application of touch screen software components and embellishments, network connectivity, using diagnostic tools and documenting the developed systems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Electrical

Common Unit Group

ICTICT203 Operate application software packages

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0011 Develop electrical integrated systems

Electrotechnology Pathway Group

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Electrical Pathway Group

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

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Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop an integrated system touch screen interface	**1.1** Areas and controls accessed from touch screen are determined from integrated systems, database and customer requirements
	1.2 Control parameters accessed from touch screen are determined from integrated systems database and confirmed with relevant person/s
	1.3 Applied enhancements to touch screen are discussed and confirmed with relevant person/s
	1.4 Touch screen and integrated system programming software incorporating project specifications are downloaded to compatible information technology
	1.5 Programming tools are used and checked for quality assurance
	1.6 Manufacturer instructions for installing and connecting touch screens are obtained and identified
2 Develop an integrated system touch screen interface	**2.1** Hazards are identified, risks are assessed and control measures implemented
	2.2 Touch screen is checked for compliance with manufacturer requirements, installed and connected
	2.3 Touch screen interface is developed using current programming methods
	2.4 Touch screen interface functions and enhancements are developed for compatibly with integrated system and

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		customer requirements
	2.5	Network connectivity is implemented, as required, and web page content made available
3 Back up, transfer and test touch screen interface	**3.1**	Work health and safety (WHS)/occupational health and safety (OHS) work completion risk control measures and workplace procedures are followed
	3.2	Touch screen interface program is backed up and transferred to the touch screen following manufacturer instructions
	3.3	Touch screen tests are conducted to verify compatibility and compliance with the integrated system and customer requirements
	3.4	Anomalies are identified and corrected to comply with manufacturer and customer requirements
	3.5	As-programmed touch screen specifications are documented and given to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Manufacturer designated software must include at least the following:	• programming a touch screen for safe and effective operation • creating and editing scenes, schedules and access control • using templates to enhance a touch screen • backing up and restoring program • transferring the programmed access to touch screen in an integrated system

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEI142A Develop an electrical integrated system interface for access through a touch screen.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0009 Develop an electrical integrated system interface for access through a touch screen

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the areas and control parameters to be accessed through the touch screen
- confirming touch screen embellishments to be applied
- downloading to a personal computer (PC) and checking touch screen programming and integrated system programming software and project data
- understanding manufacturer's instruction for installing and connecting touch screens
- checking that the installation and connections for the touch screen comply with manufacturer requirements
- developing touch screen interface functions and embellishments in accordance with compatibility with the integrated system and to customer requirements
- backing up and transferring touch screen interface program following manufacturer's instructions
- testing touch screen and correcting non-compliance operations and anomalies
- documenting the as-programmed touch screen specifications
- applying relevant workplace health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- checking programming for quality assurance
- implementing network connectivity and making web page content available.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- touch screen installation requirements and programming in integrated systems, including:
  - integrated system touch screen types, features and parameters
  - touch screen mounting methods and manufacturer's instructions
  - touch screen wiring and connection arrangements encompassing:
    - power supply

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    - integrated network
    - audio
    - video
    - IR control
    - programming
    - network
- electrical protection requirements
- programming requirements and process
- programming software specifications and tools
- human-machine interface (HMI) programming techniques with proprietary software encompassing
    - component types
    - component properties
    - arranging visible properties and creating screen embellishment
    - setting integrated system properties of components (components can be text, images, shapes, buttons, sliders, level indicators, clocks, monitors, hypertext mark-up language (HTML) and web cam images)
- methods for transferring and project data and backing up
- information technology back-up processes
- relevant risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- compliance testing and quality assurance testing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0010 Develop and test code for microcontroller devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop and test structured programming instructions for microcontroller devices at a fundamental level.

It includes microcontroller device code architecture and programming fundamentals, writing and testing specified instructions, and documenting development activities.

In this unit, the term ‘micro’ refers to microcontrollers, however, competency in the unit can be achieved using microprocessors.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify microcontroller device code to specifications	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and

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		control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of specification to be developed is determined from job performance requirements and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with person/s involved on the worksite
	1.5	Appropriate development kit and software are selected in accordance with specified requirements and required performance standards
	1.6	Strategies are implemented to ensure programming is in accordance with relevant industry standards/protocols
2 Develop microcontroller device code to specifications	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Microcontroller functions and features are applied to developing microcontroller device code specifications
	2.3	Structure and syntax are applied to developing program specification for target microcontroller function
	2.4	Key features of the assembler programming language are identified and applied to develop and test microcontroller device solutions
	2.5	Approaches to issues/problems are analysed to provide most effective solutions
	2.6	Quality of work is monitored in accordance with performance agreement/specification and/or workplace procedures or relevant industry standards
3 Test and document microcontroller device code to the required application	**3.1**	Testing workplace procedures are developed to analyse code developed
	3.2	Problems, faults and bugs are identified and rectified to ensure specification in the creation of the code is met
	3.3	Intermediate and final work reports are written in accordance with relevant industry standards and presented to appropriate person/s

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing and testing code for microcontroller devices must include at least three of the following:	• selecting an appropriate micro for a given task • setting up and using basic input/output (I/O) functions • using assembler/simulator software packages to debug program • finding system fault/s

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI156A Develop and test code for microcontroller devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0010 Develop and test code for microcontroller devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - workplace procedures and practices
  - using of risk control measures
- developing and testing structured programming instructions for microcontroller device
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing testing procedures/protocols
- identifying problems and bugs/faults in program
- rectifying problems and bugs/faults in program in accordance with workplace procedures
- using all key features of an appropriate assembler language
- writing and presenting work reports to relevant industry standards and protocols.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- fundamental structured programming instructions for microcontroller device
- memory organisation, operation and addressing methods
- microcontroller architecture
- microcontroller control system programming methods
- microcontroller devices testing protocols
- microcontroller programmer’s model
- microcontroller programming terms
- relevant industry programming standards, environment and protocols
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications

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- relevant programming language fundamentals
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing and testing code for microcontroller devices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0011 Develop electrical integrated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop electrical integrated systems.

It includes working safely; analysing and adapting project specifications, device applications and capabilities; system programming methods using diagnostic tools in developing and documenting an electrical integrated system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

ICTICT203 Operate application software packages

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Electrotechnology Pathway Group

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Electrical Pathway Group

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop an electrical integrated system	**1.1** Types and locations of loads and control devices are determined from project specifications and customer requirements
	1.2 Number of control bus networks and current requirements are determined from load calculations for devices
	1.3 Appropriate placement of system devices in system scheme is determined from bus network power and load parameters whilst maintaining system stability
	1.4 Integrated system is developed to comply with regulator safety and manufacturer specifications
	1.5 Number of devices and accessories required for the system is documented using manufacturer title and identification (ID) for each component
	1.6 Relevant programming and diagnostic tools are downloaded to compatible computer and checked for accurate operation and safety
2 Program integrated system devices	**2.1** Hazards are identified, risks assessed and control measures implemented
	2.2 Modes of programming are applied to developing the electrical integrated system in accordance with manufacturer and programming software instructions
	2.3 Manufacturer instructions and recommendations are followed when programming system devices to project specifications
	2.4 Parameters for operation of loads are programmed to project specifications within manufacturer designated range

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	2.5	Programmed system database is saved and backed up in accordance with manufacturer instructions
3 Load and test electrical integrated system	**3.1**	Work health and safety (WHS)/occupational health and safety (OHS) risk control work measures and workplace procedures are followed
	3.2	Database of integrated system programs are transferred to the network in accordance with workplace procedures
	3.3	Integrated system functions are tested for compliance with project and manufacturer specifications
	3.4	Diagnostic tools are used to locate system faults, defects or anomalies
	3.5	Defects or anomalies are corrected to comply with project requirements and manufacturer specifications
	3.6	Integrated system is documented and a copy given to client/representative

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing electrical integrated systems must include the following:	• six of the following functions:
	  • corridor linking
	  • direct load control
	  • energy saving on dimmers
	  • light level maintenance
	  • multiple load control
	  • panic button
	  • passive infrared sensor (PIR) enable/disable
	  • restrike delays
	  • scenes

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    - two-way switching
    - typical master bedroom
- using more than one programming mode
- transferring a program database to a network and testing functionality
- finding at least five hardware and five software faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI141A Develop electrical integrated systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0011 Develop electrical integrated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying appropriate modes of programming to develop the integrated system
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- checking programming and diagnostic tools
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining types and location of loads and control devices
- documenting integrated system and giving to relevant person/s
- downloading programs to network successfully
- following manufacturer instructions and recommendations in programming devices and setting load operating parameters
- inspecting and testing electrical integrated system for compliance
- loading and testing integrated systems
- placing system devices appropriately in the system scheme
- preparing to develop an integrated system
- programming integrated system devices
- saving and backing up programmed system database
- using diagnostic tools to locate and correct system defects, faults and anomalies
- using electrical integrated systems
- using load calculations to correctly determine number of networks and current requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- applications and advantages of integrated systems
- system components, including:

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  - support devices for control bus supply and control
  - support devices for programming, interconnection between networks and integration with third party systems
  - types and capabilities of output devices
  - lighting dimmer capabilities and selection
  - controlling distributed signalling interface (DSI) and communicating with digital addressable lighting interface (DALI) electronic ballasts
  - types and capabilities of input devices
- network specifications, including:
  - bus system cable type, polarity, length and acceptable topologies
  - importance of the location of output and input devices and control bus power supplies
  - ensuring control bus stability and multiple network connectivity
  - low voltage (LV) supply, overcurrent and surge protection
- software for system and device programming, monitoring and controlling
- system and device programming, including:
  - addressing conventions for networks, devices, applications, output groups, types of control and outputs, including ‘on’, ‘off’, a specific level, and over a specific time
  - personal computer (PC) programming tools and methods, including configuring networks
  - database using addressing tools and objects, function objects, editing, altering and transferring the database to a network
  - importance of project documentation and backup
- system fault-finding processes
- fault finding using multimeters, oscilloscope, system analysers and diagnostic software
- bus networks
- databases
- diagnostic tools
- electrical integrated systems
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes, including risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system components
- interconnections between networks and integration with third-party systems
- types and capabilities of input and output devices
- lighting dimmer capabilities and selection, including controlling DSI and communicating with DALI electronic ballasts.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0012 Develop structured programs to control external devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop structured programs to control an external device.

It includes identifying and developing structured programs for control sub-systems. It also includes testing and documenting structured programs for control sub-systems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify structured program requirements for control sub-system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented

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	1.3	Extent of structured programming is determined from job specifications and consultations with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with relevant person/s
	1.5	Development kit and software are selected from job specifications and in accordance with workplace procedures
	1.6	Strategies are implemented to ensure programming is written in accordance with workplace procedures
2 Develop structured programs for control sub-system	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Information technology functions are applied to develop structured programs
	2.3	Correct structure and syntax are applied to developing structured program
	2.4	Programming languages are applied to structured programs to develop and test solutions
	2.5	Issues/problems are analysed to identify and apply solutions
	2.6	Quality of work is monitored in accordance with workplace procedures
3 Test and document structured program for control sub-system	**3.1**	Developed program is tested in accordance with workplace procedures and manufacturer specifications
	3.2	Programming anomalies are identified and corrected in accordance with workplace procedures and manufacturer specifications
	3.3	Work reports are written in accordance with workplace procedures and presented to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing structured programs to control external devices for a given representative range of programs and control devices must include the following attributes:

- safe working practices
- control applications
- knowledge application
- analogue or digital input/output (I/O) signals
- program writing and testing
- documenting programming changes

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI155A Develop structured programs to control external devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0012 Develop structured programs to control external devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing testing procedures
- identifying and correcting anomalies in programs
- identifying and developing structured programs for control sub-systems
- meeting scheduled timeframes
- producing relevant documentation
- testing and documenting structured programs for control sub-systems
- using functions of relevant programming languages
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- control applications of software
- software terminology
- programming languages currently used by industry
- program development
- programming concepts, including:
  - programming structure
  - documentation
  - compiling source code
  - generating executable files

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  - scalar and structured data types
  - constants variables
  - reading from keyboard and writing to screen
  - arithmetic, relational and logical operations
  - making decisions
  - looping operations
  - programming to access external devices via input/output (I/O) boards
  - functions - macros
  - global and local variables, auto and static variables
  - intrinsic functions used in control
  - writing functions
  - linking in external functions to control hardware
  - numerical and character arrays
- control programming fundamentals, including:
  - control applications of software
  - software terminology
  - programming languages currently used by industry
  - program development, including flowcharts, pseudocode and algorithms
  - programming concepts
- job safety assessments or risk mitigation processes, including risk control measures
- problem-solving techniques
- relevant manufacturer specifications
- relevant programming languages, functions and applications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, enter and verify programs for programmable logic controller (PLC) (also known as programmable controller) for a system requiring discrete control functions.

It includes working safely, using control systems and control system development methods, using ladder diagrams/statement list/function block diagram instruction sets, following written instructions, and documenting program development and testing activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify control system requirements	**1.1** PLC operating functions, parameters and specifications are determined from relevant documentation, electrical drawings or persons to determine the control system scope of work

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	1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.3	Control system scenario is developed from job specifications of process/plant/machine controlled through consultation with relevant person/s
	1.4	PLC block diagram is developed using industry standard symbols
	1.5	Infotechnology equipment, software and measuring devices needed to carry out the PLC work are obtained and checked for correct operation and safety
	1.6	Installation of PLC is checked for compliance with relevant industry standards, regulations and job specifications
2 Develop control system, enter and test program	**2.1**	Established WHS/OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Circuits/machines/plant are checked and isolated in accordance with workplace procedures
	2.3	Control system solutions are developed and documented based on specified control mode and using acceptable methods for designing control systems
	2.4	Developed control system is converted to an appropriate form
	2.5	Program is entered into the PLC using appropriate infotechnology and software
	2.6	Entered instructions and settings are tested in accordance with job specifications by control system scenario
	2.7	Appropriate methods and tools are used to test control system and operating faults and anomalies are identified and rectified
	2.8	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to persons and equipment
3 Verify document and report programming	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

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activities

3.2 Program is transferred from PLC to external medium for storage

3.3 Control system specification and program are documented in accordance with workplace procedures

3.4 Work completion is documented and relevant persons notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, entering and verifying programs for PLCs must include at least five (5) of the following functions/controls:

- bit shift registers
- cascading counters
- cascading timers
- combining timers and counters
- constant duty cycle
- derived timers (off delay)
- internal relays/flags/markers
- jump instructions
- latching relays (set/reset)
- master control instructions
- one shot
- retentive (power fail) functions
- reversible counters
- scan time considerations
- self-resetting
- simple step sequence instructions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI150A Develop, enter and verify discrete control programs for programmable controllers.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including identifying programmable logic controller (PLC) risk control measures
- connecting the PLC
- correcting programming anomalies
- dealing with unplanned situations in accordance with workplace procedures in a manner that minimises risk to persons and control equipment
- developing applications for PLC functions including operation and programming of inputs and outputs
- developing a control system solution to specified operating functions and parameters
- developing a PLC block diagram, including identifying industry standard PLC symbols
- documenting control system and programming
- identifying PLC modules and applications
- programming a PLC using industry standard methods such as master control, jump, shift register, step sequencing, timers and counters
- testing and verify control system inputs and outputs operation
- transferring programs to PLC
- documenting control system and programming clearly
- identifying non-compliance conditions of device installation
- converting control system to a PLC program
- entering programming functions and parameters correctly
- transferring program to external storage.

Knowledge Evidence

- Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:
- PLC introduction including:

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- evolution of the programmable controller and applications
- relay control, static logic control and programmable control
- programmable controller block diagram (inputs and outputs)
- programmable controller advantages, symbols and functions
- numbering systems start-up procedures
- programming inputs and outputs
- operation of programmable controller inputs
- PLC operation: scan cycle
- basic programming
- types of PLC programs, including:
- ladder diagrams
- basic programming
- program modification
- ladder diagram development
- connecting the programmable controller
- programming timers, including:
- purpose of timers
- timer instructions
- on-delay and off-delay timer instruction
- programming timers
- retentive and non-retentive timers
- cascading timers
- the self-resetting timer
- monitoring timers
- circuit conversion
- programming counters, including:
- counter instructions
- retentive and non-retentive, up/down, programming, self-resetting and cascading counters
- circuit conversion
- program storage, including:
- PLC terms
- memory
- the programmable read only memory (PROM) pack
- printing ladder diagrams
- PLC input and output modules, including:
- purpose of modules
- analogue, dry contact, alternating current (a.c.) and direct current (d.c.) input modules
- relay, triac, transistor and analogue output modules
- PLC installation requirements, including:

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- installation precautions
- safety systems
- mounting the PLC
- installation documentation
- routing signal and power cables
- earthing requirements
- master control, including:
- master control relay
- master control relay ladder diagram
- programming master control relays
- jump function, including:
- jump function
- jump function ladder diagram
- programming jump functions
- the shift register, including:
- purpose of registers
- the shift register
- shift register operation
- clock input
- shift register requirements
- programming shift registers
- the step sequencer, including:
- step sequencers
- step sequencer operation
- clock input
- step sequencer requirements
- programming step sequencer
- PLC diagnostics and fault finding, including:
- PLC fault finding
- controller status
- input/output (I/O) faults
- program faults
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including relevant industry standard documentation and regulations related to PLCs
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0014 Develop, enter and verify programs in supervisory control and data acquisition systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, enter and verity programs in supervisory control and data acquisition (SCADA) system.

It includes identifying, developing and entering programs using dedicated SCADA software. It also includes monitoring, verifying and documenting programming activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

UEEIC0015 Develop, enter and verify word and analogue control programs for programmable logic controllers

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify SCADA system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are

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		identified obtained and applied
	1.2	Hazards are identified, risks are assessed and control measures implemented
	1.3	Extent of SCADA system is determined from design brief and job specifications
	1.4	Process data is analysed for development of graphical design/mimic diagrams
	1.5	Programmable logic controller (PLC) analogue and digital addresses are related to tag databases
	1.6	Tag data types are entered and configured in tag database
	1.7	Graphic objects are created and added to a graphic library, as required, in accordance with vendor software
	1.8	Security requirements are determined for SCADA system to prevent access by unauthorised person/s
	1.9	SCADA system is configured to provide appropriate reporting mechanisms
	1.10	Equipment, software and testing devices for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Develop and enter program using dedicated SCADA software	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	SCADA software is used to develop human-machine interface (HMI) processes and to accept and implement operators control instructions
	2.3	Supervisory control functions, data acquisition components and automated tasks are programmed using SCADA software
	2.4	Data is manipulated within the SCADA software to function in accordance with design brief and job specifications
	2.5	Alarms and limits for processing variables are identified and programmed in accordance with workplace procedures

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	2.6 Trends for process variables and limits are programmed in accordance with workplace procedures and manufacturer instructions
	2.7 Reports are configured to display/print appropriate information
	2.8 User rights/security is configured to provide appropriate access to SCADA system
	2.9 Unplanned situations are responded to in accordance with workplace procedures and selected for safety and specified work outcomes
3 Monitor verify and document programming activities	**3.1** Device operation is tested in accordance with WHS/OHS requirements and workplace procedures
	3.2 Entered objects and settings are tested in accordance with job specifications and manufacturer specifications
	3.3 SCADA software tools are used to test and monitor programs, and operating anomalies are identified and corrected in accordance with workplace procedures
	3.4 WHS/OHS work completion risk control measures and workplace procedures are followed
	3.5 SCADA system specifications and programs are documented in accordance with workplace procedures
	3.6 Work completion is reported and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, entering and verifying programs	• at least five graphic objects

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in SCADA systems must include the following:

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI152A Develop, enter and verify programs in Supervisory Control and Data Acquisition systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0014 Develop, enter and verify programs in supervisory control and data acquisition systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- analysing data
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- configuring user access rights
- correcting programming faults and anomalies
- creating graphic objects and adding to graphic's library
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing and entering programs using dedicated supervisory control and data acquisition (SCADA) software
- developing human-machine interfaces (HMIs)
- developing SCADA system from design brief and job specifications
- documenting SCADA system programming
- entering tag data types into configured database
- identifying programs for SCADA systems
- monitoring, verifying and documenting programming activities
- producing reports using SCADA
- programming supervisory control functions and data acquisition components.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- SCADA system communications and networking, including:
  - programmable logic controller (PLC) interface requirements
  - networking requirements of the system

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  - SCADA system differences from distributed control system (DCS) and process control systems
  - SCADA (HMI software package costing
  - types of networks available with SCADA HMI
  - coordinate and access of networking to factory network
  - the difference between SCADA and process control systems
- mimics and animated graphics, including:
  - graphic designs, balance clarity of layout and navigation
  - assessment of data required to be entered in software package
  - validation of entered data
- trending, including:
  - analysis of process to select data, including sampling of the process
  - viewing data and graphical representation of selected information
  - trend graphs and data matching
  - the difference between real time trends and historic trends
- alarm logging, including:
  - analysing selected data and applying limits to processes
  - corrective actions and notifications of alarm status
  - alarm data availability for third-party software systems
- recipes and scheduling, including:
  - methods of producing libraries for different process parameters required for varied production runs
  - analysis of different production runs, including amounts of materials, pressure, temperature and weights
  - alarm limits/material specifications
  - where and when scheduling is used
  - scheduling, setting limits and evoking program changes
- data collection and databases, including:
  - produce a database of variable tags and range specifications involved in the process
  - conversion export of raw data into appropriate forms for data management and report creation, e.g., Excel and Paradox
  - types and layout of reports
  - aims of customer, management, statistical and account reports
  - analysis of data in reports: design and graphical data representations
  - assessment of data required for the report
- programming language, including:
  - scripting languages in SCADA HMI software
  - automate tasks within the software PLC or SCADA
- complex processing of process data where field equipment i.e. PLC does not have the capability or to minimise control lag

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- implementation and applications, including:
  - typical applications in manufacturing and process control, e.g., food processing, packaging, automotive industry, energy management and steel production and mining
- relevant databases
- relevant equipment, software and testing devices
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation and reporting
- relevant workplace policies and procedures
- SCADA system authorised user access and security requirements
- SCADA systems programming
- tag databases and PLCs.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0015 Develop, enter and verify word and analogue control programs for programmable logic controllers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop, enter and verify word/text and analogue control programs for programmable logic controllers (PLCs).

It includes identifying, developing and entering industrial control system programs, as well as monitoring, verifying and documenting programming activities. It also includes installing and testing programs for an industrial system requiring advanced control functions using structure logic and acceptable design techniques.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify industrial control system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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		are identified and applied
	1.2	Hazards are identified, risks are assessed and control measures implemented
	1.3	Mode of operation of control system is determined from job specifications and consultations with relevant person/s
	1.4	Equipment, software and testing devices for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.5	Installation of programmable controller is checked for compliance with regulations, relevant industry standards and job specifications
2 Develop and enter programs for industrial control system	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Control solutions are developed and documented based on operational mode and using acceptable methods for designing control system containing numeric variables and values
	2.3	Control solution is entered using information technology and appropriate software
	2.4	Programming elements are written and used to manipulate word data
	2.5	Program control values are assigned using applicable numbering systems and codes
	2.6	Programs are written to read and write analogue signals
	2.7	Arithmetic functions are used to scale analogue inputs to a specified input range
	2.8	Arithmetic functions are used to un-scale an engineering value to drive an analogue output
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
3 Monitor, verify and document programming activities	**3.1**	Device operation is tested in accordance with workplace procedures and manufacturer specifications

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3.2 Programming is tested in accordance with specified control mode requirements

3.3 Operating anomalies are identified and corrected in accordance with workplace procedures

3.4 WHS/OHS work completion risk control measures and procedures are followed

3.5 Control system specifications and programs are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing, entering and verifying word/text and analogue control programs for PLCs must include at least five of the following:

- hardware configuration
- software configuration
- number systems
- converting between systems
- basic diagnostics
- binary word structure
- integer (INT), double integer (DINT) and REAL arithmetic operations
- scaling and un-scaling engineering units

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI151A Develop, enter and verify word and analogue control programs for programmable logic controllers.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0015 Develop, enter and verify word and analogue control programs for programmable logic controllers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- consulting with relevant person/s
- correcting programming anomalies
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining modes of operation from job specifications
- developing and entering programs for industrial control systems
- developing control solutions
- developing control systems to required operating functions and parameters
- documenting control system and programming clearly
- entering programming functions and parameters
- identifying industrial control systems/programs
- installing programmable controllers
- monitoring, verifying and documenting programming activities
- obtaining relevant equipment, software and testing devices
- testing and verifying device operations
- using arithmetic functions to scale and un-scale engineering values
- using word data, numbering systems and codes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- numbering systems and codes, including:
  - types of numbering systems

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  - codes
  - application of codes
  - conversion between codes and numbering systems
- use programmable logic controller (PLC) software, including:
  - install programming software
  - memory mapping
  - computer software
  - manufacturer's instruction manuals
- PLC hardware, including selection, installation, configuration, signals and resolution
- analogue modules, including:
  - comparison of signals
  - resolution of analogue signals
  - connection of analogue field
  - programming
  - loop fault
- data manipulation, including:
  - IEC data types
  - word structure
  - select bits transfer
  - move
  - block transfer
  - compare
  - block compare
  - and words
  - mask
  - maths function
  - scaling and un-scaling
  - special registers
  - shift register
  - multiplexing
- sequencer, including:
  - application
  - event and time driven
  - programming application
- languages including:
  - ladder
  - code structure format (CSF)
  - state logic (STL)
- diagnostics, including:
  - special register

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  - software diagnostics
  - edits
  - rung scan faults
- complex industrial process, including:
  - describe process
  - write program
  - edit program
  - connect and run program
  - documentation
- analogue and word programming
- analogue modules
- control systems and programmable controllers
- job safety assessments or risk mitigation processes
- numbering systems and codes
- relevant arithmetic functions
- relevant equipment, software and testing devices
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEEIC0016 Diagnose and rectify faults in a.c. motor drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in systems controlling starting, speed, torque, power output, efficient running and braking alternating current (a.c.) motor drive systems.

It includes working safely; interpreting technical data; applying knowledge of a.c. motor operating parameters to logical fault-finding techniques; implementing fault rectification, safety and functional inspection; testing; and reporting work activities and outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify a.c. motor drive system faults	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are documented on job safety assessments and risk control measures devised and implemented in consultation with relevant person/s
	1.4 Scope of fault/s is determined from fault report/s, relevant documentation and in consultation with relevant person/s
	1.5 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify a.c. motor drive system fault/s	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to inspect, test or measure live work is determined and conducted in accordance with WHS/OHS requirements and workplace procedures, as required
	2.3 Circuits/machines/plant are inspected, checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods/techniques are applied to diagnose a.c. motor control system faults employing

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		measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Fault scenarios are tested and confirmed as being the source of system problems in accordance with workplace procedures
	2.6	Causes of the faults are identified and relevant person/s identified to rectify the fault, as required, outside the scope of the a.c. motor drive control system
	2.7	Faults in the control components of the system are rectified in accordance with a.c. motor control system operation standards
	2.8	System is inspected and tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are determined from discussions with relevant person/s, job specifications and requirements
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently, without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Relevant person/s is notified in accordance with workplace procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in a.c. motor drive systems must include at least four of the following:	• faults in systems controlling starting, speed, torque, power output, efficient running and braking a.c. motor drive system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI145A Diagnose and rectify faults in a.c. motor drive systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0016 Diagnose and rectify faults in a.c. motor drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying logical diagnostic methods
- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting fault diagnosis and rectification activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting fault rectification activities and outcomes in accordance with workplace procedures
- identifying faults and determining components needed to rectify them
- inspecting, testing and verifying that the alternating current (a.c.) electrical system operates correctly
- preparing to diagnose and rectify faults in a.c. motor drive system
- rectifying faults in a.c. motor drive system controls
- using fault scenarios to test the cause of system faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant problem-solving techniques
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures
- variable speed drive (VSD) systems for a.c. motors, including:
  - methods and operating principles
  - installation requirements
  - filtering
  - performance characteristics
  - set-up and commissioning
  - common faults, their symptoms and causes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in a.c. motor drive systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0017 Diagnose and rectify faults in d.c. motor drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in systems controlling starting, speed, torque, power output, and efficient running and braking of direct current (d.c.) motor drive systems.

It includes applying safe working practices; interpreting technical data; applying knowledge of d.c motors operating parameters to logical fault-finding techniques; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify d.c. motor drive system fault/s	**1.1** WHS/ OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, control measures and workplace procedures are implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are documented on job safety assessments and risk control measures devised and implemented in consultation with relevant person/s
	1.4 Scope of fault/s is determined from fault report/s, relevant documentation and in consultation with relevant person/s
	1.5 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify d.c. motor drive system fault/s	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to inspect, test or measure live work is determined and conducted in accordance with WHS/OHS requirements and workplace procedures, as required
	2.3 Circuits/machines/plant are inspected, checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods/techniques are applied to diagnose d.c. motor control system fault/s employing

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		measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Fault scenarios are tested and confirmed as being the source of system problems in accordance with workplace procedures
	2.6	Causes of faults are identified and relevant person/s identified to rectify the fault, as required, outside the scope of the d.c. motor drive control system
	2.7	Faults in the control components of the system are rectified in accordance with d.c. motor control system operation standard
	2.8	System is inspected and tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are determined from discussions with relevant person/s, job specifications and requirements
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently, without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Relevant person/s is notified in accordance with workplace procedures that the system fault/s have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in d.c. motor drive systems must include at least the following:

- four faults in a d.c. motor control system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI146A Diagnose and rectify faults in d.c. motor drive systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0017 Diagnose and rectify faults in d.c. motor drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying logical diagnostic methods
- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting fault diagnosis and rectification activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting fault rectification activities and outcomes in accordance with workplace procedures
- identifying faults and determining components needed to rectify them
- inspecting, testing and verifying that the electrical direct current (d.c.) motor drive system operates correctly
- preparing to diagnose and rectify faults in d.c. motor drive system
- rectifying faults in electrical d.c. motor drive system controls
- using fault scenarios to test the cause of system faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- diagnosing and rectifying faults in d.c. motor drive system
- relevant job safety assessments or risk mitigation processes, including:
  - safe working practices
- relevant manufacturer specifications

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- relevant problem-solving techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- variable speed drives for d.c. motor/s, including:
  - methods and operating principles
  - installation requirements
  - filtering
  - performance characteristics
  - set-up and commissioning
  - common faults their symptoms and causes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in d.c. motor drive systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0018 Diagnose and rectify faults in digital controls systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in digital controls systems.

It includes preparing, diagnosing and rectifying faults. It also includes completing and reporting fault diagnosis, interpreting diagrams and technical data, applying knowledge of digital systems to logical fault-finding processes, implementing fault rectification, and safety and functional testing.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Electrical Pathway Group

UEECD0020 Fix and secure electrotechnology equipment

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied.
	1.2 Hazards are identified, risks are assessed and control

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		measures implemented
	1.3	Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from relevant person/s
	1.4	Extent of work is determined from reports, other documentation and discussions with appropriate person/s
	1.5	Appropriate person/s are consulted to ensure work is coordinated effectively with others
	1.6	Tools, equipment and testing devices required for diagnosing faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Need to test or measure live electrical components is determined in accordance with workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with workplace procedures
	2.4	Logical diagnostic methods are applied to diagnose electronic control system apparatus faults by employing measurements and estimations of system operating parameters
	2.5	Scenarios are tested as suspected cause of system faults
	2.6	Fault causes are identified and relevant person/s engaged where fault is outside scope of digital subsystems
	2.7	Faults in electronic components of control system are rectified
	2.8	System is tested and verified as operating to specified job requirements
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Methods for dealing with unplanned situations are selected based on safety and specified work outcomes

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	2.11	Diagnosis and rectification work activities are performed using sustainable energy principles and practices without wasting materials, damaging apparatus, the surrounding environment or services
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Relevant person/s is notified of system fault rectification in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in digital control systems must include at least four of the following faults:	• open circuit • short circuit • incorrect or failed connections • insulation failure • unsafe condition • apparatus/component failure • related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI139A Diagnose and rectify faults in digital controls systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0018 Diagnose and rectify faults in digital controls systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying logical diagnostic methods
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- completing and reporting fault diagnosis and rectification activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- diagnosing and rectifying faults
- documenting fault rectification
- identifying faults, causes and rectification methods
- isolating circuits/machines/plant
- obtaining tools, equipment and testing devices
- preparing to diagnose and rectify faults
- rectifying faults in digital subsystems
- testing and measuring live electrical components
- using scenarios to test causes of system faults
- verifying system operates as intended.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- digital control systems, including:
  - comparison between analogue and digital signals
  - advantages of digital control systems
  - digital/analogue control system
  - logic gates

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  - truth tables
  - digital testing devices
- numbering systems, including:
  - the binary number system
  - the octal number system
  - the hexadecimal number system
  - binary addition and subtraction
  - conversion between numbering systems
  - binary coded decimal (BCD)
  - Gray code
  - the American Standard Code for Information Interchange (ASCII)
- combinational logic networks, including:
  - precautions when handling electronic devices due to electrostatic discharge (ESD)
  - truth tables
  - basic operation and characteristics of logic devices
  - logic probes
  - verification of operation of logic circuits
- logic families and specifications, including:
  - logic families and specifications
  - transistor-transistor logic (TTL)
  - complementary metal oxide silicone (CMOS) logic families
  - the unit load concept
  - specifications and features of TTL, TTL low power Schottky (LS) and CMOS logic families
  - three state and open collector logic
  - input and output voltage characteristics for CMOS and TTL
  - comparison of TTL with CMOS logic families
  - unit load
  - noise margin
  - interfacing different logic families
  - tri-state logic devices
- encoders and decoders, including:
  - weighted and unweighted codes
  - Gray
  - BCD
  - ASCII
  - half and full adder
  - error detection
  - decoder and encoder integrated circuits
  - multiplexer and demultiplexer integrated circuits

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-
- flipflops, including:
  - RS flipflops
  - D flipflops
  - JK flipflops
  - truth tables and operation
  - debouncing a switch
  - timing diagrams
  - sequential logic
  - state tables and timing diagrams
- registers, including shift registers and data latches
- counters, including:
  - ripple counters using JK flipflops
  - typical integrated circuit types
  - characteristics and operation
  - ripple counters
  - use of feedback to modify count
  - circuit verification of a ripple counter
  - synchronous counters
  - series and parallel data transfer
  - multivibrators
  - interconnecting digital circuits to perform an application
- digital-to-analogue (D/A) conversion, including:
  - industrial applications of D/A converters
  - summing D/A converters
  - R-2R D/A converters
  - verification of circuit operation of an IC D/A converter
- analogue-to-digital (A/D) conversion, including:
  - industrial applications of A/D converters
  - digital ramp, dual slope, successive approximation and simultaneous (flash) A/D converters
  - verification of circuit operation of an IC A/D converters
- display devices, including:
  - liquid-crystal display (LCD) devices
  - light-emitting diode (LED) devices.
  - operation and characteristics
  - seven segment LED displays
  - drive requirements
  - current limiting
  - multiplexed displays

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  - seven segment encoding chips
  - emerging display technologies
- digital fault finding, including:
  - general fault-finding principles
  - common digital faults
  - digital test equipment
  - locating a fault
- interfacing logic devices to external loads, including:
  - interfacing with a transistor
  - interfacing with a relay
  - solid state switches
  - opto-isolator
  - verification of circuit operation of an opto-coupler
- programmable logic devices, including:
  - programmable logic devices
  - applications of programmable logic devices
  - types of programmable logic devices
  - comparison between different programmable logic devices
  - programmable array logic (PAL)
  - programmable logic devices (PLD)
  - field programmable gate arrays (FPGA)
  - programming and verifying correct operation of a programmable array logic device
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- system testing and verification techniques
- diagnostic methods including digital fault finding, including:
  - diagnostic tools, equipment and testing devices
  - digital control systems, including comparison between analogue and digital signals
  - numbering systems, including binary number system, octal number system and hexadecimal number system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0019 Diagnose and rectify faults in servo drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in system controlling servo drive systems.

It includes applying safe working practices; interpreting technical data; applying knowledge of servo/stepper drives operating parameters to logical fault-finding processes; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0042 Solve problems in single phase electronic power control circuits

UEEIC0040 Solve problems in polyphase electronic power control circuits

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify servo drive system faults	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with relevant person/s
	1.4 Scope of fault/s is determined from fault report/s, relevant documentation and in consultation with relevant person/s
	1.5 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify servo drive system fault/s	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to inspect, test or measure live work is determined and conducted in accordance with WHS/OHS requirements and workplace procedures, as required
	2.3 Circuits/machines/plant are inspected, checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Logical diagnostic methods/techniques are applied to diagnose servo/stepper drive control system faults employing measurements and estimations of system

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		operating parameters referenced to system operational requirements
	2.5	Fault scenarios are tested and confirmed as being the source of system problems in accordance with workplace procedures
	2.6	Cause of the fault/s is identified and relevant person/s identified to rectify the fault/s, as required, outside the scope of the servo/stepper drive control system
	2.7	Faults in the control components of the system are rectified in accordance with servo drive control system operation standard
	2.8	System is inspected and tested to verify that the system operates as intended and to specified requirements
	2.9	Decisions for dealing with unplanned situations are determined from discussions with relevant person/s, job specifications and requirements
	2.10	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently, without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Relevant person/s is notified in accordance with workplace procedures that the system fault/s has been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in servo drive systems must include at least two of the following:

- faults in a servo/stepper drive control system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI147A Diagnose and rectify faults in servo drive systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0019 Diagnose and rectify faults in servo drive systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- completing and reporting fault diagnosis and rectification activities
- diagnosing and rectifying faults in servo drive systems
- applying logical diagnostic methods
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting fault rectification activities and outcomes in accordance with workplace procedures
- identifying faults and determining components needed to rectify them
- inspecting, testing and verifying that the system operates correctly
- rectifying faults in in servo drive system controls
- using fault scenarios to test the source of system faults
- preparing to diagnose and rectify faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- causes of hunting in servo drive systems
- common faults, symptoms and causes in servo drive systems
- difference between an open loop and a closed loop system
- differences in operation between types of servo mechanism systems

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- inspection, testing and alignment of a servo mechanism system
- programming and configuration of a programmable logic controller (PLC) driven servo system
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- servo mechanism systems
- servo mechanism terminology and concepts.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to diagnosing and rectifying faults in servo drive systems.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair analogue circuits and components in electronic control systems.

It includes fault finding and repairing analogue circuits as well as completing and reporting on fault and repair activities. It also includes analogue circuits and components to logical fault-finding processes, implementing fault rectification, safety and functional testing.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

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Electrical Pathway Group

UEECD0020 Fix and secure electrotechnology equipment

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to fault find analogue circuits	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks assessed and control measures implemented
	1.3 Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from relevant person/s
	1.4 Extent of faults is determined from reports, other relevant documentation and discussions with relevant person/s
	1.5 Relevant person/s is consulted to ensure work is coordinated with others
	1.6 Tools, equipment and testing devices required to diagnose faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Fault find and repair analogue circuits	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Need to test or measure live electrical components is determined in accordance with workplace procedures
	2.3 Circuits/machines/plant are checked and isolated in accordance with workplace procedures
	2.4 Logical diagnostic methods are applied to electronic control system apparatus faults by employing measurements and estimations of system operating parameters
	2.5 Scenarios are tested as suspected cause of system faults
	2.6 Fault causes are identified and relevant person/s engaged where fault is outside scope of analogue circuits and components
	2.7 Faults in electronic components of control system are

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		rectified
	2.8	System is tested and verified as operating to specified job requirements
	2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.10	Methods for dealing with unexpected situations are selected based on safety and specified work outcomes
	2.11	Diagnosis and rectification work activities are performed using sustainable energy principles and practices without waste of materials, damaging apparatus, the surrounding environment or services
3 Complete and report fault-find and repair activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Work site is made safe in accordance with workplace safety procedures
	3.3	Rectification of faults is documented in accordance with workplace procedures
	3.4	Relevant person/s is notified of system fault rectification in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and repairing must include at least four of the following faults in analogue circuits and components:	• open circuit • short circuit • incorrect or failed connections • insulation failure • unsafe condition

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- apparatus/component failure
- related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI124A Fault find and repair analogue circuits and components in electronic control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying diagnostic methods
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- completing and reporting faults and repairs
- consulting relevant person/s
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting fault rectification
- finding and repairing faults of analogue circuits
- identifying, rectifying and determining extent of faults and causes
- isolating circuits/machines/plant
- obtaining tools, equipment and testing devices
- rectifying faults in system analogue circuits and components
- testing and measuring live electrical components
- using fault scenarios to test causes of system faults
- verifying the control system operates correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- amplifier fundamentals, including:
  - the purpose and application of amplifiers
  - the basic characteristics of small signal amplifiers
  - the ideal operational amplifier
- basic operational amplifier configurations, including:

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- various operational amplifier circuit configurations and where they are used
- measured and calculated values of gain and output voltage for various operational amplifier configurations
- circuit configurations, including:
  - inverting
  - non-inverting
  - voltage follower
  - summing
  - comparators
  - Schmitt trigger
  - differential configurations
- operational amplifier limitations, including:
  - use of frequency compensation
  - offset null
  - bias compensation
  - slew rate
  - frequency response
  - bandwidth
  - noise figures
- single-stage amplifiers, including:
  - determination of direct current (d.c.) bias conditions for a single-stage amplifier
  - small signal terminal characteristics of single-stage amplifiers
  - effects of coupling and by-pass capacitors in single-stage amplifiers
- amplifier applications, including:
  - operation of multi-stage amplifiers
  - effects of component values and frequency response
  - negative feedback loop in multi-stage amplifiers
  - negative feedback and amplifier parameters
  - effects on the output voltage when amplifiers are subjected to control signal overdrive, bias faults and amplifying device faults
- operational amplifier /diode circuits, including:
  - clippers
  - clamp circuits
  - precision rectifiers
- oscillators, including:
  - oscillator circuits using operational amplifiers
  - sine wave
  - square wave
  - triangular wave
  - sawtooth

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- operational amplifier /resistance/capacitance (RC) circuits, including:
  - integrator
  - differentiator
  - function generators
- filters, including:
  - active filter circuits
  - first and second order
  - low, high and band pass circuits
- timers, including operation of typical timer integrated circuits
- power amplifiers including:
  - power output integrated circuits
  - power amplifiers using operational amplifiers
  - power supplies
- multi-stage circuits, including:
  - circuits using several different operational amplifier configurations
  - fault-finding procedures
- analogue circuit faults
- analogue circuits and components in electronic control systems
- diagnostic methods
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- system testing and verification techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0021 Find and rectify faults in process final control elements

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and rectify faults in process final control elements.

It includes working safely, interpreting valve specifications, applying knowledge of final control elements operating parameters, conducting tests and repairs, and completing the necessary service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0023 Install instrumentation and control cabling and tubing

UEEIC0022 Install instrumentation and control apparatus and associated equipment

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults in final control elements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Scope of final control element fault is obtained from documentation tests and/or work supervisor to determine work
	1.4 Need to inspect, test and measure operating systems is determined in accordance with WHS/OHS requirements and workplace procedures
	1.5 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.6 Sources of materials required for work are determined in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find faults in final control elements and associated equipment	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Fault finding is approached using processes control valves, actuators and positioners using measured and calculated values in accordance with workplace procedures
	2.4 Apparatus components are dismantled, as required, and parts stored to protect against loss or damage in accordance with workplace procedures
	2.5 Faulty components are rechecked and fault status confirmed in accordance with workplace procedures
	2.6 Unplanned situations are dealt with safely and with the approval of relevant person/s

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	2.7	Fault-finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
3 Rectify faults in final control elements and associated equipment	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Apparatus is inspected and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3	Materials required to rectify faults are sourced and obtained in accordance with workplace procedures
	3.4	Rectification and repairs are conducted without damage to components, apparatus or circuits
	3.5	Repairs are tested in accordance with workplace procedures
	3.6	Apparatus is reassembled, tested and prepared for return to service
	3.7	Repairs are carried out without damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
4 Complete and report fault-finding and rectification activities	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Work area is cleaned and made safe in accordance with workplace procedures
	4.3	Repairs to control valves is documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Finding and rectifying faults in final control elements must include at least two of the following:

- final control elements
- associated equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI111A Find and rectify faults in process final control elements.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0021 Find and rectify faults in process final control elements

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- applying variable speed drives (VSD)
- checking and isolating apparatus
- dealing with unplanned situations safely and with the approval of relevant person/s
- determining need for inspecting, testing or measuring operating systems
- determining sources of materials required for work
- dismantling apparatus components, as required, and storing to protect against loss or damage
- finding faults in final control elements and associated equipment
- measuring control valves actuators and positioners and calculating values to identify faults
- obtaining scope of final control element faults
- obtaining tools, equipment and testing devices required to carry out work
- preparing to find and repair faults in final control elements
- replacing/rectifying and repairing components without damage using sustainable energy principles
- sourcing and obtaining materials required to rectify faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- control valve body and trim types and flow characteristics
- control valve selection
- power cylinder (piston actuator) types
- problem-solving techniques
- relevant components, apparatus or circuits

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- relevant control valves including:
  - control valves actuators and positioners measurements and calculations
- relevant industry standards
- relevant isolation procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant material, tools and equipment
- relevant rectification and repairs
- relevant VSD
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- self-acting pressure and temperature control valves
- spring opposed diaphragm actuator
- sustainable energy principles
- valve positioners.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that current industry practices in relation to finding and rectifying faults in process final control elements and associated equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0022 Install instrumentation and control apparatus and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install instrumentation and control apparatus and associated equipment.

It includes preparing and installing instrumentation and control apparatus and associated equipment, as well as completing and reporting installation activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify instrumentation, control apparatus and associated equipment	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures are implemented
	1.4 Installation of apparatus is prepared in consultation with relevant person/s and scheduled
	1.5 Nature and location of work is determined from documentation and/or relevant person/s to determine scope of work
	1.6 Location of instrumentation, control apparatus and associated equipment is planned within constraints of building structure, significants and regulations
	1.7 Advice is sought from relevant person/s to ensure work is coordinated with others in accordance with workplace procedures
	1.8 Materials needed for installation work are obtained in accordance with workplace procedures and checked against job requirements
	1.9 Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked by supervisor to ensure no damage has occurred and work complies with job requirements
2 Install instrumentation, control apparatus and associated equipment	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed

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	2.2	Need to test or measure live electrical components is determined in accordance with WHS/OHS regulatory requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with workplace procedures
	2.4	Instrumentation, control apparatus and associated equipment are installed with sufficient excess to adjust and maintain terminations in accordance with technical standards, manufacturer specifications and job requirements
	2.5	Wiring and tubing is terminated at instrumentation, control apparatus and associated equipment in accordance with manufacturer specifications, functional and regulatory requirements
	2.6	Unplanned situations are discussed with relevant person/s and documented in accordance with workplace procedures
	2.7	Unplanned situations are dealt with safely and with approval of authorised person/s in accordance with workplace procedures
	2.8	Regular quality checks of installed apparatus are undertaken in accordance with workplace procedures
	2.9	Apparatus installation is performed without waste of materials, damage to apparatus, circuits, surrounding environment or services using sustainable energy principles and practices
3 Complete and report installation activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to installed apparatus to ensure it meets job requirements
	3.4	‘As-installed’ apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Instrumentation and control apparatus and associated equipment must include at least four of the following:	• pressure measurement apparatus and systems • temperature measurement apparatus and systems • level/density measurement apparatus and systems • flow measurement apparatus and systems • chemical measurement apparatus and systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI108A Install instrumentation and control apparatus and associated equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0022 Install instrumentation and control apparatus and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- checking circuits/machines/plant are isolated
- cleaning and making safe worksite
- completing and reporting installation activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying and installing instrumentation, control apparatus and associated equipment
- locating and installing instrumentation, control apparatus and associated equipment
- obtaining relevant materials and checking against job requirements
- obtaining tools, equipment and testing devices
- terminating wiring and tubing
- undertaking regular quality checks in accordance with relevant industry standards.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- instrumentation and control equipment installation requirements and techniques
- live electrical components
- quality checks
- regulatory requirements, including:
  - equipment specification
  - manufacturer s installation instructions
  - system specifications
  - communication/signal cabling installation requirements

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  - power wiring requirements
  - initial set-up procedures
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- wiring and tubing terminations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0023 Install instrumentation and control cabling and tubing

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install instrumentation and control cabling and tubing.

It includes identifying and installing cabling, tubing and accessories. It also includes completing and reporting installation activities, routing cables and tubing to specified locations, terminating cables and tubing, and connecting wiring at accessories, instruments and control apparatus.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify cabling and tubing	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures are implemented
	1.4 Installation of cabling and tubing is prepared in consultation with relevant person/s and scheduled in accordance with workplace procedures
	1.5 Nature and location of work is determined from documentation and/or relevant person/s to determine scope of work
	1.6 Cable and tube routes are planned within constraints of building, plant structure, significants and regulations
	1.7 Advice is sought from appropriate person/s to ensure work is coordinated effectively with others
	1.8 Material needed for installation work is obtained in accordance with workplace procedures and checked against job requirements
	1.9 Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Work is checked by supervisor to ensure and work complies with job requirements
2 Install cabling, tubing and accessories	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 Plant/machines/equipment are checked and isolated in accordance with workplace procedures
	2.3 Cabling, tubing and accessories are installed to comply with technical standards, job specifications and work

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		requirements with sufficient excess to affect terminations
	2.4	Accessories are installed in required locations within acceptable tolerances
	2.5	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.6	Tubing is terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.7	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.8	Unplanned situations are responded to in accordance with workplace procedures and approval of authorised person/s
	2.9	Ongoing quality checks of installed wiring is undertaken in accordance with workplace procedures
	2.10	Cabling and tubing installations are performed using sustainable energy principles without wasting materials and energy, damaging apparatus or surrounding environment in accordance with workplace procedures
3 Complete and report installation activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks are made to ensure installed wiring conforms to requirements
	3.4	'As-installed' cables, tubes and accessories are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Wiring and tubing must include the following:

- at least three wiring systems:
  - armoured cable
  - fire performance cables
  - thermoplastic insulated (TPI) cable
  - thermoplastic sheathed (TPS) cable
  - unshielded twisted pair (UTP), foiled twisted pair (FTP), shielded twisted pair (STP) and coaxial communications cables
- at least two tubing types:
  - low pressure metallic and non-metallic tubing
  - high pressure tubing

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI107A Install instrumentation and control cabling and tubing.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0023 Install instrumentation and control cabling and tubing

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- acquiring relevant materials, tools, equipment and testing devices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including identifying risk control measures
- applying sustainable energy principles and practices
- checking installed wiring is compliant
- communicating and dealing with other person/s when scheduling and planning work
- completing and reporting installation activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying and installing cabling, tubing and accessories
- placing and securing accessories in accordance to specified drawings
- routing, placing and securing cables and tubing to comply with requirements
- terminating cables and tubing to comply with requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- instrumentation cable types and terminations, including:
  - cable specifications
  - cable applications
  - cable preparation
  - cable termination
  - connection hardware
- instrumentation pneumatic/hydraulic control tubing/piping, including:
  - control tubing/piping

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  - pneumatic/hydraulic terms
  - cutting pipe tubing/piping
  - bending, shaping/setting pipe and tubing
  - joining connecting/terminating tubing/ piping
  - instrumentation air supply maintenance
- job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0024 Plan the electrical installation of integrated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan the electrical installation of integrated system.

It includes implementing integrated system scenario and installation by determining bus system parameters, topology and installation requirements, bus system cables and terminations, control and dimming methods; and planning and documenting integrated installation plan.

A network topology is the arrangement of a network, including its nodes and connecting lines. In a bus network topology, every workstation is connected to a main cable called the bus.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Electrotechnology Pathway Group

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Electrical Pathway Group

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine integrated system scenario	**1.1** Customer requirements for scenes, events and controls in an integrated system are determined from job specifications and appropriate person/s
	1.2 Types and locations of integrated system loads are determined from job specifications and customer requirements
	1.3 Types and locations of control (input) devices of integrated system are determined from job specifications and customer requirements
	1.4 Budget for the integrated system is determined from customer and appropriate person/s
2 Plan integrated system	**2.1** Hazards are identified, risks assessed and control measures implemented
	2.2 Integrated system devices and capabilities are incorporated the system plan
	2.3 Number and types of output devices to meet scenario specified are chosen for compatibility with system loads
	2.4 Number and types of control (input) devices to meet system scenario specified are obtained
	2.5 Integrated systems are planned to comply with bus system and supply voltage parameters in accordance with job specifications
	2.6 Other control methods are considered in developing an integrated system plan in accordance with workplace procedures
	2.7 Integrated systems are planned within cost and budget constraints

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	2.8	Final plan is documented and submitted to appropriate person/s for approval in accordance with workplace procedures
3 Implement integrated system installation	**3.1**	Work health and safety (WHS)/occupational health and safety (OHS) risk control work measures and workplace procedures are followed
	3.2	Integrated system is arranged using appropriate topology in accordance with workplace procedures
	3.3	Connection chart/diagram between devices in the integrated system is developed in accordance with workplace procedures
	3.4	Appropriate cable for the bus system is selected and connected at devices and accessories using the methods and the polarity specified by manufacturer specifications

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Electrical installation of integrated systems must include the following:	• three integrated systems one of which has at least four separate scenes and five control requirements
Documentation must include the following:	• explanations of how the customer requirement will be achieved • a material list with costs and a marked-up floor plan showing relationship of load groups to input device/s

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI140A Plan the electrical installation of integrated systems.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0024 Plan the electrical installation of integrated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- arranging an integrated system using an acceptable topology
- complying with a given budget
- complying with manufacturer instructions/specifications
- considering other control methods in planning the integrated system
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining customer requirements for integrated system
- determining scenario specifications including number and types of control systems
- developing a connection chart/diagram
- developing appropriate topology for integrated system
- documenting integrated system plan
- identifying integrated system scenario
- implementing an integrated system installation
- planning installations of integrated system
- planning integrated system to comply with bus system and supply voltage parameters

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- acceptable and unacceptable topologies for a single network
- bus system parameters, including:
  - how bus systems work
  - network topology
  - voltage and current limits

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  - cable type and length limits
  - network impedance
  - network and device status indication
- low voltage (LV) supply, voltage parameters and quality
- supply sources such as uninterruptable power supplies (UPS) and inverters may adversely effect voltage parameters and waveform
- cabling, including:
  - insulation resistance testing precautions and prohibitions
  - LV cable terminations and conductor size
  - bus cable polarity and pairing, termination requirements and techniques
  - field and enclosure segregation requirements related to related to relevant industry standards
- supply and load protection, including:
  - conductors and protection device coordination
  - protection on supply and load side of system devices
  - use of residual current devices (RCDs)
- output devices, including:
  - relay connections for extra-low voltage (ELV) and LV loads
  - dimmer types
  - supply and load connections for the various dimmer types
- installation requirements for input devices, including:
  - passive infrared detectors
  - light level control
  - key inputs
  - touch screens
- acceptable and unacceptable topologies for a single network
- connection chart/diagrams
- devices and connections for other control methods, including:
  - distributed signalling interface (DSI) and gateway dimming and control
  - devices and connections digital addressable lighting interface (DALI) dimming and control
  - zero to 10 volts analogue control
- installation requirements for input devices
- installations of integrated systems for input devices, including passive infrared detectors, light level control, key inputs, and touch screens
- job specifications and customer requirements
- LV supply, voltage parameters and quality, including supply sources such as UPS and inverters which may adversely affect voltage parameters and waveforms
- manufacturer documentation
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation

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processes
- relevant cabling industry standards, including:
  - cable type and length limits, including network impedance
  - how bus systems work and network topology
  - voltage and current limits
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- risk control measures
- supply and load protection
- acceptable and unacceptable topology requirements for a single network.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0025 Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solutions to extra-low voltage (ELV) electro-pneumatic elements operating at ELV and variable speed drives.

It includes working safely, establishing required control functions, checking device installation, entering instruction into programmable devices, following workplace instruction and procedures and completing documentation.

Electrical connections referred to in this unit are confined to pre-assembled plug and socket sets. This unit does not cover competencies for installation and connection of electrical wiring.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to problem solve electro-pneumatic control systems	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are reported on job safety assessments and advice on risk control measures is sought from relevant supervisor
	1.4 Control functions and drive system required to perform work are identified and documented from work instructions/specifications, relevant work supervisor or customer
	1.5 Tools, equipment, inspection and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Provide electro-pneumatic control systems solutions	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
	2.3 Circuits for electro-pneumatic control and drive system are developed to meet the required functions and specifications
	2.4 Locations of control field devices are inspected, checked and adjusted to ensure they function correctly
	2.5 Circuits for the electro-pneumatic control and drive system component connections are inspected and

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		checked against the developed circuits specifications
	2.6	Functioning of the systems entering into programmable components and parameters is set in accordance with developed circuit and manufacturer programming instructions/specifications
3 Inspect, test and document electro-pneumatic control systems	**3.1**	Operation of the electro-pneumatic control and drive system is tested in accordance with WHS/OHS requirements and workplace procedures
	3.2	Operating anomalies are identified and corrected in accordance with workplace procedures
	3.3	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.4	Worksite is cleaned and made safe in accordance with workplace procedures
	3.5	Work completion is reported and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing an electro-pneumatic system using a programable logic controller (PLC) must include the following:	• at least four digital input/outputs (I/O) • at least one analogue output

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI138A Provide solutions to extra low voltage (ELV) electro-pneumatic control systems and drives.

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Links

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Assessment Requirements for UEEIC0025 Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing and documenting functions that the control and drive system is required to perform
- developing and documenting circuits for the electro-pneumatic control and drive systems that meet the required functions
- checking location of control field devices and adjusting to ensure correct functioning
- checking electro-pneumatic control and drive system components connections
- entering functions and parameters into programmable components correctly
- correcting programming anomalies
- testing and verifying correct operation
- reporting work completion to appropriate persons in accordance with established procedures
- dealing with unplanned events
- applying problem-solving techniques, including:
  - preparing to developing solutions
  - providing solutions
  - inspecting, testing and documenting solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical and pneumatic control fundamentals, including:

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- electrical and pneumatic safety encompassing:
  - hazardous and safe working methods and procedures
  - pneumatic operating pressures
  - isolation procedures
- electrical/pneumatic drawing types and applications encompassing:
  - drawing layouts and conventions (electrical and pneumatic schematics, wiring and piping diagrams)
  - drawing symbols
- electrical and pneumatic control system components encompassing:
  - electrical components, including power, human-machine interfaces (HMIs), relays, plug and socket connectors; pneumatic components, including air supply systems, HMIs, valves, actuators, tubing and connectors
- electrical relay types encompassing:
  - operation
  - contact configurations
- pneumatic control valves and actuators encompassing:
  - types and their operation
  - activated and deactivated configurations
- basic logic as applied to control systems
- logic confined to AND, OR, NOT and NOR functions
- variable speed drive (VSD) functions and configuration
- VSD functions and set-up, including:
  - basic function of a variable speed drive in controlling an induction motor
  - configuring a VSD encompassing:
    - setting rated motor voltage and current, digital and analogue inputs, speed range and ramp times
  - testing procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant problem-solving techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0026 Provide solutions to fluid circuit operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide the solution to fluid circuit operations.

It includes identifying and providing the solution to fluid circuit operation problems, completing work and documenting solutions to the operation of fluid-controlled circuits. It also includes applying problem-solving procedures, using measuring instruments, applying appropriate circuit theorems, and providing solutions derived from measurements and calculations and justification for solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify fluid circuit	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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operation problem		are identified and applied
	1.2	Hazards are identified, risks are assessed and control measures implemented
	1.3	Circuit problems are identified from documentation and consultation with supervisor to determine scope of work
	1.4	Advice is sought from supervisor to ensure work is coordinated effectively with relevant person/s
	1.5	Sources of materials required for work are identified in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Provide solutions to fluid circuit problem	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Need to test or measure live circuits are determined in accordance with workplace procedures
	2.3	Circuits are checked and isolated in accordance with workplace procedures
	2.4	Fluid circuit problems are solved using measured and calculated values
	2.5	Unplanned situations are responded to in accordance with workplace procedures and approval of relevant person/s in a manner that minimises risk to personnel and equipment
	2.6	Problems are solved using sustainable energy principles without wasting materials, damaging apparatus circuits, the surrounding environment or services in accordance with workplace procedures
3 Complete work and document solutions to fluid circuit problem	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Solutions used to solve circuit problems are justified and documented in accordance with workplace procedures

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3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fluid power circuits as they apply to problems related to engineering diagnosis and development work functions must include two of the following types of circuit problems:	• determining the operating parameters of an existing circuit • altering an existing circuit to comply with specified operating parameters • developing circuits to comply with a specified function and operating parameters
Pumps and associated control equipment must include the following:	• hydraulic • pneumatic

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI125A Provide solutions to fluid circuit operations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0026 Provide solutions to fluid circuit operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- completing work and documenting solutions to problem
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting justification of solutions
- identifying fluid circuit operations
- isolating work area
- obtaining tools, equipment and testing devices
- preparing to provide solutions to fluid circuit problems
- providing solutions to circuit problems from measurements and calculations, including:
  - operation and construction of a basic hydraulic circuit
  - operation and construction of pneumatic circuit
- providing solutions to fluid circuit problems
- sourcing work materials
- testing or measuring live circuits
- using established problem-solving methods
- working with and referring to others to solve problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- common terms and definitions used in fluid power systems

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- applications of fluid power
- Pascal's law relevant to force transfer, multiplication and intensification
- mathematical relationships involving:
  - temperature and volume (Charles law)
  - pressure and volume (Boyles law)
- fluid power principles relevant to components and the identification of components
- operation of fluid power components
- interpretation of fluid system operation from circuit diagrams
- operation and construction of basic pneumatic circuit
- operation and construction of a basic hydraulic circuit
- routing maintenance procedures
- safety requirements
- fluid circuit operation problems
- relevant circuit theorems, measurements and calculations, including providing solutions derived from measurements
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant tools, equipment and measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- terms and their definitions used in fluid power systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0027 Provide solutions to pneumatic-hydraulic system operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solutions to pneumatic-hydraulic system operations.

It includes identifying, providing, completing and documenting solutions to discovered problems in pneumatic-hydraulic system operations. It also includes setting up and maintaining pneumatic and hydraulic systems; applying problem-solving procedures, including using measuring instruments; applying appropriate circuit theorems; and providing solutions derived from measurements and calculations and justification for such solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0026 Provide solutions to fluid circuit operations

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Identify pneumatic-hydraulic system operations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 System problems are identified from documentation and consultation with supervisor to determine scope of work
	1.4 Advice is sought from supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for work are identified in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Provide solution to pneumatic-hydraulic operation system	**2.1** WHS/OHS risk control work measures and procedures are followed
	2.2 Need to test or measure live work systems is determined in accordance with workplace procedures
	2.3 Systems are checked and isolated in accordance with workplace procedures
	2.4 Pneumatic-hydraulic system problems are solved using measured and calculated values
	2.5 Unplanned situations are responded to in accordance with workplace procedures and approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.6 Problems are solved using sustainable energy principles without waste of materials, damage to apparatus circuits, the surrounding environment or services in accordance with workplace procedures
3 Complete work and document solutions to discovered problem	**3.1** WHS/OHS work completion risk control measures and procedures are followed
	3.2 Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Solutions used to solve circuit problems are justified and documented in accordance with workplace procedures

3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Pneumatic-hydraulic power systems as they apply to problems related to engineering diagnosis and development work functions must include one of the following:	• determining the operating parameters of an existing system • altering an existing system to comply with specified operating parameters • developing systems to comply with a specified function and operating
Pneumatics must include at least two of the following main components:	• cooler • dryer • filter • receiver
Pneumatic control devices must include at least two of the following components:	• linear actuator • rotary actuator • directional control valve • timer • counter
Hydraulics must include at least two of the following main components:	• two-cylinder sequenced system • single cylinder skip-check system
Hydraulic control devices must include at least two of the following components:	• rotary actuators • linear actuators • directional control valve • rotary control valve • pressure control valve

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEI126A Provide solutions to pneumatic-hydraulic system operations.

Links

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Assessment Requirements for UEEIC0027 Provide solutions to pneumatic-hydraulic system operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- completing work and documenting solutions to discovered problems
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- giving written justification of solutions provided
- isolating work area
- obtaining tools, equipment and testing devices
- providing solutions to pneumatic-hydraulic system operations including constructing pneumatic-hydraulic circuits from control diagrams
- sourcing work materials
- taking relevant measurements accurately
- testing or measuring live circuits
- using established problem-solving methods
- working with and referring to others to solve problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- common terms and definitions used in pneumatic components and systems
- application, operation and installation requirements of pneumatic components and systems
- interpretation and selection of manufacturer's equipment specifications to establish the performance of pneumatic components
- pneumatic circuits from control diagrams
- location and correction of faults on pneumatic components and systems

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- common terms and definitions used in hydraulics components and systems
- application, operation and installation requirements of hydraulic components and systems
- interpretation and selection of manufacturer's equipment specifications to establish the performance of hydraulic components
- hydraulic circuits from control diagrams
- location and correction of faults on hydraulics components and systems
- job safety assessments or risk mitigation processes
- pneumatic-hydraulic system operation problems
- relevant manufacturer specifications, including performance of pneumatic components and hydraulic components
- relevant tools, equipment and measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- risk control measures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0028 Provide solutions to problems in industrial control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide solution to an industrial control systems problem.

It includes identifying, providing, testing and documenting a solution to industrial control system problems. It also includes interpreting process and circuit diagrams, applying knowledge of industry controls to problem-solving techniques, and safety and functional testing.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0018 Diagnose and rectify faults in digital controls systems

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

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and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Electrical Pathway Group

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify industrial control system problem	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 Extent of industrial control system problems are determined from job specifications, situation reports and consultations with relevant person/s
	1.4 Work activities are planned to meet scheduled timelines in consultation with relevant person/s
	1.5 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Provide solution to industrial control system problem	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Industrial control system devices, circuit operation characteristics and applications are applied to develop solutions to control problems
	2.3 Parameters, specifications and job requirements for each industrial control system problem are obtained in accordance with workplace procedures
	2.4 Industrial control system problems are evaluated to determine most effective solution
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6 Control system problem is resolved using sustainable energy practices without wasting materials, damaging apparatus, surrounding environments or services in accordance with workplace procedures
3 Test and document solution to industrial	**3.1** WHS/OHS risk control measures and workplace

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control system problems		procedures for carrying out the work are followed
	3.2	Solutions to industrial control system problems are tested to determine effectiveness and modified, as required
	3.3	Adopted solutions are documented including instructions incorporating risk control measures
	3.4	Solutions used to solve industrial control system problems are justified and documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing solutions must include at least four of the following:	• industrial control system problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI120A Provide solutions to problems in industrial control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0028 Provide solutions to problems in industrial control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining extent of and evaluating solutions to resolve industrial control system problems
- documenting justification of solutions implemented in accordance established procedures
- meeting scheduled timelines
- obtaining parameter specifications and performance requirements
- preparing to provide solutions to industrial control system problems
- providing solutions to industrial control system problems
- testing and documenting solutions to industrial control system problems
- testing solution to industrial control system problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- control amplifiers, including:
  - introduction
  - amplifier operation
  - operational amplifiers
  - operational amplifier configurations
- industrial transducers, including:
  - introduction
  - International System of Units (SI)

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  - forms of energy
  - transducer terminology
  - temperature measurement
  - force measurement
  - speed measurement
  - positional measurement
- industrial final control elements, including:
  - introduction
  - electromagnetic devices
  - valves
  - solid state switching devices
- industrial control systems, including:
  - automatic control
  - open loop control
  - closed loop control
  - control system terminology
  - control system evaluation
  - two position control
  - proportional control (P)
  - proportional + integral control (P+I)
  - proportional + derivative control (P+D)
  - proportional + integral + derivative control (P+I+D)
- industrial control loops and control signals, including:
  - introduction
  - control loops
  - converters (digital-to-analogue and analogue-to-digital)
  - multiplexing
- circuit operation, characteristics and applications
- industrial control systems problems
- operation and safety of relevant tools, equipment and testing devices
- parameter specifications and performance requirements for control system problems
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- solutions to industrial control system problems
- sustainable energy principles and practices.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0029 Set up and adjust PID control loops

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and adjust proportional-integral-derivative (PID) control loops

It includes working safely, applying problem-solving procedures, evaluating performance, using measuring devices, providing solutions to control problems and documenting solutions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0043 Solve problems in direct current circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

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Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on process control loops	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3 Scope of control problem is obtained from documentation and/or from work supervisor to determine work to be undertaken
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2 Solve process control loops problems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Process controller/transmitters/converters and control loops are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Measured and calculated values are used for solving

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		process control loops problems
	2.5	Unexpected situations are dealt with safely and in accordance with workplace procedures
	2.6	Problems are solved without damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete work and provide status report/s	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Status report/s is completed and work supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and adjusting problems in PID controllers must include at least two of the following:	• determining the operating parameters of a controller in an existing control loop • configuring/tuning a controller in an existing control loop to comply with specified operating parameters • configuring/tuning a controller to comply with a specified function

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI106A Set up and adjust PID control loops.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0029 Set up and adjust PID control loops

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- checking and isolating process controller/transmitters/converters and control loops
- completing status reports and/or notifying work supervisor
- dealing with unplanned situations in accordance with workplace procedures
- determining sources of materials required for work
- determining to test and measure live work
- measuring and calculating values for solving process control loop problems
- obtaining and checking tools, equipment and testing devices for correct operation and safety
- obtaining scope of control problem from documentation and/or from work supervisor
- preparing to work on process control loops
- solving process control loop problems
- solving problems without damage to apparatus, the surrounding environment or services using sustainable energy principles.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- isolation procedures
- problems-solving techniques
- process control loop principles, including:
  - connection of controllers
  - introduction to control systems, including control loop components, purpose of control loop components, open and closed loop control, control loop block diagram, direct acting and reverse acting controllers

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  - process control terminology
  - process controllers, including proportional-integral-derivative (PID) functions, applications of PID modes of control, applications of controller options, checking/adjustment of controllers and reset windup
  - testing of control modes
  - types of control and control modes
- process characteristics
- relevant industry standards
- relevant manufacturer specifications and operating instructions
- tuning and installation of control loops
- relevant process controller/transmitters/converters and control loops
- job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including
  - status reports
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to solving problems in process control loops
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEEIC0030 Set up and adjust advanced PID process control loops

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and adjust advanced proportional-integral-derivative (PID) process control loops.

It includes working safely and to standards, following set-up and adjustment procedures, applying knowledge of process requirements, testing and reporting.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to tune control loop with advanced functions	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.5 Advanced control loop parameters are identified by reviewing process specifications and equipment instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with relevant industry standards
	1.8 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits/machines/plant are inspected, tested and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Tune control loop for advanced functions	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2 Testing/measuring devices are connected and set up in accordance with relevant industry standards and control system for advanced functions
	2.3 Control set-point is determined and control loop adjusted in accordance with relevant industry standards and process specifications
	2.4 Process is observed and decisions made in consultation with process operation personnel to readjust control loop settings to ensure process demand and output quality are met
	2.5 Process control loops are readjusted, as required, and checked
	2.6 Methods for dealing with unexpected situations are discussed with relevant person/s and documented
	2.7 Unplanned situations are dealt with safely and with the approval of relevant person/s in accordance with workplace procedures
	2.8 Quality inspection is conducted of process output to ensure control loop is tuned in accordance with workplace procedures
	2.9 Tuning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report control loop tuning activities	**3.1** WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2 Worksite is cleaned and made safe in accordance with workplace procedures
	3.3 Control loop settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI110A Set up and adjust advanced PID process control loops.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0030 Set up and adjust advanced PID process control loops

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adjusting control loops to satisfy process demand and quality
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - risk control measures
- carrying out tuning without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- connecting and setting up testing/measuring devices
- dealing with unplanned situations with the approval of authorised person/s
- determining control set-point and adjusting control loop in accordance with relevant industry standards and process specifications
- determining the need to inspect, test and measure live work
- documenting control loop settings in accordance with workplace procedures
- identifying advanced control loop parameters
- inspecting and isolating circuits/machines/plant
- inspecting quality of process output to ensure control loop is tuned
- obtaining tools, equipment and testing devices required for work
- preparing to tune control loops with advanced functions
- tuning control loop for advanced functions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- configuration of advanced control loops, including cascade, ratio and feed forward
- inspection and testing procedures
- isolation procedures
- problem-solving techniques
- relevant advanced control loop parameters

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- relevant advanced process control, including:
  - connection of controllers
  - process controllers
  - testing of control modes
  - tuning and installation of control loops
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant testing/measuring devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up advanced process measuring and control instruments
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up and configure human-machine interface (HMI) and industrial networks.

It includes preparing the process control schemes that meet safety and process requirements, and selecting control equipment and interconnecting cabling and tubing/piping based on calculated and measured arrangements.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0043 Solve problems in direct current circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up and configure HMI and industrial networks	**1.1** Scope of the control system is determined from job specifications
	1.2 Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for the control system are identified, obtained and applied
	1.3 Control apparatus and interconnecting components required for control system are arranged and determined from job specifications and in accordance with process control systems and relevant industry standards
2 Set up and configure HMI and industrial networks	**2.1** Manufacturer specifications and limitations of relevant control apparatus is sought and comparisons made with process parameters and control requirements in accordance with job specifications
	2.2 Control apparatus is selected in accordance with compatibility with process parameters, control requirements and relevant environmental conditions
	2.3 Specified apparatus ingress protection (IP) rating is sought from manufacturer specifications, as required
	2.4 Control valves are selected in accordance with percentage travel flow and loop-and-process characteristics, optimum size, range ability, ability to cope with process pressures and relevant environmental conditions
3 Select interconnecting cabling and tubing/piping	**3.1** Control cabling and configuration are selected in accordance with relevant environmental conditions and interconnection requirements
	3.2 Tubing/piping and accessories are sized to capacity and pressure requirements in accordance with job specifications
	3.3 Route lengths of cable and tubing/piping are determined from site drawings in accordance with job specifications

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3.4	Process control system is arranged and specifications for all selected items are documented in accordance with workplace procedures and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and configuring HMI and industrial networks must include the following:	• at least two process control systems with:
	  • more than one input
	  • more than one final control element

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI113A Set up and configure human-machine interface (HMI) and industrial networks.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- comparing process parameters and control requirements with the control apparatus
- determining control apparatus and interconnecting components required for control system
- determining the scope of the control system
- documenting control system arrangement and specifications for items selected
- preparing to set up and configure human-machine interface (HMI) and industrial networks
- seeking specified apparatus ingress protection (IP) rating from manufacturer specifications
- selecting control valve in accordance with workplace procedures and relevant industry standards
- selecting interconnecting cabling and tubing/piping
- setting up and configuring HMI and industrial networks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- analogue and digital signals
- distributive control principles (DCS)
- purpose and application of control system networks
- relevant apparatus IP rating
- relevant HMI and industrial networks
- relevant industry process control systems
- relevant interconnecting cabling and tubing/piping
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions

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- relevant process parameters and control requirements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- telemetry components
- telemetry installation
- telemetry overview
- telemetry systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to setting up and configuring HMI and industrial networks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0032 Set up electronically controlled robotically operated complex systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up electronically controlled and robotically operated complex systems.

It includes working safely, applying knowledge of electronic circuits and the integration to robotically operated equipment and systems, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical circuits are those encountered in meeting performance requirements and compliance standards, revising machine operating parameters and dealing with machine malfunctions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0001 Analyse complex electronic circuits controlling fluids

UEEIC0018 Diagnose and rectify faults in digital controls systems

and

UEECD0043 Solve problems in direct current circuits

or

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UEECD0044 Solve problems in multiple path circuits
UEECD0046 Solve problems in single path circuits

Electrical Pathway Group
UEEEL0003 Arrange circuits, control and protection for electrical installations
UEEEL0008 Evaluate and modify low voltage heating equipment and controls
UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls
UEEEL0010 Evaluate and modify low voltage socket outlets circuits
UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits
UEEEL0023 Terminate cables, cords and accessories for low voltage circuits
UEEEL0024 Test and connect alternating current (a.c.) rotating machines
UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group
UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits
UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals
UEEIC0041 Solve problems in pressure measurement components and systems
UEEIC0038 Solve problems in density/level measurement components and systems
UEEIC0039 Solve problems in flow measurement components and systems
UEEIC0043 Solve problems in temperature measurement components and systems
UEEIC0029 Set up and adjust PID control loops
UEEIC0030 Set up and adjust advanced PID process control loops
UEEIC0048 Verify compliance and functionality of instrumentation and control installations
UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare electronically controlled and robotically operated system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3 Scope of work to be undertaken is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with person/s involved in the work
	1.5 Strategies are determined and solution developed and implemented in accordance with workplace procedures
2 Set up electronically controlled and robotically operated system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Controls and integrated robot systems are applied in developing analytical solutions to machine parameters/faults and operation
	2.3 Parameter specifications and performance requirements in relation to each circuit and robot device are obtained in accordance with workplace procedures and relevant industry standards
	2.4 Setting up maintenance and/or modification activity is carried out to provide the most effective solution/s in accordance with workplace procedures
	2.5 Unplanned events are dealt with safely and effectively in accordance with regulatory requirements and workplace policy and procedures
	2.6 Quality of work is monitored in accordance with performance agreement and/or workplace procedures or relevant industry standards

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3 Document and report results of system set-up and actions taken	**3.1**	Set-up maintenance activity and/or modification is inspected and tested to determine their effectiveness and modified, as required
	3.2	Set-up maintenance activity and/or modification is documented to include details of fault findings, calculations and assumptions
	3.3	Set-up maintenance activity and/or modification is reported to appropriate person/s to determine suitable action/s to be taken based on fault-finding analysis
	3.4	Justification for analysis findings and any actions to be undertaken in relation to the work activity are documented for inclusion in work/project records in accordance with relevant standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up electronically controlled and robotically operated complex systems must include at least two types of machines and include the following:	• typical systems encountered in meeting performance requirements and industry standards • revising machine operating parameters • dealing with machine malfunctions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI130A Set up electronically controlled robotically operated complex systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0032 Set up electronically controlled robotically operated complex systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- planning set-up of electronically controlled and robotically operated complex systems
- documenting and reporting on the results of the set-up and actions taken
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining strategies for analysing circuit and robot performance effectively
- documenting instruction for implementing any actions resulting from the analysis that incorporates risk control measure to be followed
- documenting justification of actions to be implemented in accordance with relevant industry standards and workplace procedures
- identifying the operation of electronic and robot controls
- inspecting and testing the results of the analysis
- obtaining circuit control and robot parameters, specifications and performance requirements appropriate to each situation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electronic interfacing to robotic processes
- interfacing electronics with robot functions, including:
  - robot types and selection and pre-selection planning
  - robot installation, including pre-installation design, layout and system documentation

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  - interfacing of robot controller with other external control systems
  - robot sensor devices, characteristics and application
  - diagnostic functions
  - maintenance scheduling and procedures
  - special features, including safety, palletising and sub-routines
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant problem-solving techniques
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment currently used in industry
- resources that reflect current industry practices in relation to setting up electronically controlled and robotically operated complex systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0033 Set up gas analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up gas analysis measuring and control instruments.

It includes working safely, identifying measuring parameters, testing and measuring work, following isolating procedures, arranging measuring instruments, dealing with unplanned situations and following documenting procedures.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to arrange gas analysis measuring instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on worksite
	1.5 Measurement parameters are identified by reviewing process requirements and instrument manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with workplace procedures
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Arrange gas analysis measuring instruments	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Testing/measuring devices are connected and arranged in accordance with relevant industry standards and control system
	2.3 Measuring instruments are arranged and adjusted in accordance with workplace procedures and instrument

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		manufacturer instructions
	2.4	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.5	Unplanned situations are dealt with safely and with approval of a relevant person/s
	2.6	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report set-up activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and adjusting measuring and control instruments must include at least two of the following:	• gas analysis measuring instruments

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI131A Set up gas analysis measuring and control instruments.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0033 Set up gas analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- arranging and adjusting measuring instruments in accordance with workplace procedures and instrument manufacturer instructions
- arranging gas analysis measuring instruments
- carrying out work efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- checking preparatory work to ensure no damage to equipment
- completing and reporting set-up activities
- connecting and arranging testing/measuring devices
- dealing with unplanned situation by discussing with relevant person/s and documenting
- determining need to test and measure live work
- documenting adjustment settings in accordance with workplace procedures
- identifying measurement parameters
- isolating circuits/machines/plant
- obtaining tools, equipment and testing devices required for work
- preparing to arrange gas analysis measuring instruments.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- principle of operation of various indicators connected in remote measurement loop
- problem-solving techniques
- relevant gas measuring and control instruments
- relevant industry standards

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- relevant isolation procedures
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles
- types of recorder used in process measurement.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practice in relation to arranging gas analysis measuring and control instruments
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0034 Set up industrial field control devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up an industrial field control device.

It includes identifying, setting up, testing and documenting industrial field control device. It also includes following design briefs, operating principles, interpreting device specifications, following manufacturer specifications and testing device operation parameters.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0018 Diagnose and rectify faults in digital controls systems

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Electrical Pathway Group

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

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UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify industrial field control device	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed, and control

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		measures implemented
	1.3	Industrial field control devices are determined from control system specifications and consultation with relevant person/s
	1.4	Work activities are planned to meet scheduled timelines in consultation with relevant person/s
	1.5	Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Set up industrial field control device	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Industrial field control devices are set up and operated in accordance with manufacturer instructions
	2.3	Industrial field control devices are positioned and adjusted in accordance with operating principles manufacturer instructions
	2.4	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.5	Industrial field control devices are set up using sustainable energy principles without waste of materials, damaging apparatus, surrounding environments or services in accordance with workplace procedures
3 Test and document set-up of industrial field control device	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Operating anomalies are identified and corrected in accordance with workplace procedures
	3.3	Work completion is documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up industrial field control devices must include at least four of the following:

- measurement/detection of flow
- temperature
- pressure
- density
- weight
- level
- smoke
- motion

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI119A Set up industrial field control devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0034 Set up industrial field control devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- complying with scheduled timeframes
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting field control device set-up in accordance workplace procedures
- identifying field control devices to be set up
- positioning and adjusting devices in accordance with manufacturer operating instructions and system requirements
- preparing and setting up industrial field control devices
- testing and documenting setting up of industrial field control devices
- testing field devices and making final adjustments to correct anomalies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial processes and the terminology used in measurement, including:
  - forms of energy
  - general classification of transducers
  - measurement technology
  - static accuracy
- devices used in optoelectronic systems, including:
  - physics of light
  - spectral response

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  - photometry
  - light sources and detectors
  - lens and mirror theory
  - optoelectronic systems and photoelectric switches
  - optoelectronic circuits
  - the laser
- temperature detection and measurement and their circuit configurations, including:
  - introduction to temperature sensing
  - bimetallic and filled thermal sensors
  - thermocouples, resistance temperature detectors, thermistors, solid state temperature, sensors, integrated circuit temperature sensors and phrometers
  - control circuits using temperature detectors
- measurement of pressure, flow and chemical, including:
  - diaphragm, bellows and venturi
  - strain gauges and load cells
  - ultrasonic and magnetic flowmeters
  - measurement technology and accuracy
  - viscosity, humidity and pH
- linear, angular and rotary motion detection, including:
  - linear motion sensors
  - angular and rotary motion sensors
  - shaft angle encoders
  - linear encoders
  - tachometers
  - accelerometer and vibrometer
- proximity and level detection, including:
  - mechanical
  - ultrasonics
  - microwave
  - passive infrared
  - nucleonics
  - capacitive and inductive proximity
- industrial field control devices set-up, operation, positioning and adjustment
- relevant job safety assessments, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

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Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0035 Set up scientific analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up scientific analysis measuring and control instruments.

It includes working safely, preparing and setting up scientific measuring instruments, applying calibration procedures and reporting activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to arrange scientific analysis measuring instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on worksite
	1.5 Measurement parameters are identified by reviewing process requirements and instrument manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with industry standards
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Arrange scientific analysis measuring instruments	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Testing/measuring devices are connected and arranged in accordance with relevant industry standards and control system
	2.3 Measuring instruments are arranged and adjusted in accordance with workplace procedures and instrument

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		manufacturer instructions
	2.4	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.5	Unplanned situations are dealt with safely and with approval of relevant person/s
	2.6	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report arrangement activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and adjusting measuring and control instruments must include at least two of the following:	• scientific analysis measuring instruments

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI133A Set up scientific analysis measuring and control instruments.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0035 Set up scientific analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- arranging and adjusting measuring instruments in accordance with workplace procedures and manufacturer instructions
- carrying out work without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
- checking preparatory work to ensure no damage has occurred
- consulting with relevant person/s to coordinate work with others
- dealing with unplanned situations by discussing with relevant person/s and documenting in accordance with WHS/OHS requirements
- documenting adjustment settings and notifying relevant person/s in accordance with workplace procedures
- identifying measurement parameters
- obtaining and checking tools, equipment and testing devices
- preparing scientific analysis measuring instruments
- testing and measuring live work in accordance with WHS/OHS requirements and workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant circuits/machines/plant
- relevant communications protocols
- relevant isolation procedures

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- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, apparatus, environment and services
- relevant measurement parameters
- relevant measuring instruments
- relevant scientific analysis industry standards
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices setting up process measuring and control instruments for scientific analysis
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0036 Set up water analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up water analysis measuring and control instruments.

It includes working safely, identifying measuring parameters, testing and measuring work, following isolating procedures, arranging measuring instruments, dealing with unplanned situation and following documenting procedures.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to arrange water analysis measuring instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on worksite
	1.5 Measurement parameters are identified by reviewing process requirements and instrument manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with workplace procedures
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Arrange water analysis measuring instruments	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Testing/measuring devices are connected and arranged in accordance with relevant industry standards and control system
	2.3 Measuring instruments are arranged and adjusted in accordance with workplace procedures and instrument

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		manufacturer instructions
	2.4	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.5	Unplanned situations are dealt with safely and with approval of relevant person/s
	2.6	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report arrangement activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and adjusting measuring and control instruments must include at least the following:

- two water analysis measuring instruments

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI132A Set up water analysis measuring and control instruments.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0036 Set up water analysis measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- arranging and adjusting measuring instruments in accordance with workplace procedures and instrument manufacturer instructions
- carrying out work efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
- checking preparatory work to ensure no damage has occurred
- completing and reporting set-up activities
- connecting and arranging testing/measuring devices
- dealing with unplanned situation by discussing with relevant person/s and documenting
- determining need to test and measure live work
- documenting adjustment settings in accordance with workplace procedures
- identifying measurement parameters
- isolating circuits/machines/plant
- obtaining tools, equipment and testing devices required for work
- preparing to arrange water analysis measuring instruments.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial applications of specified water analysis equipment
- principle of operation of an analyser measuring elements
- principle of operation of an analyser sensor
- problem-solving techniques
- relevant circuits/machines/plant
- relevant water measuring and control instruments

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- relevant installation requirements for specified analysers
- relevant isolation procedures
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant system checks and instrument calibration
- relevant terms associated with industrial water analysis equipment
- relevant tools, equipment and testing devices
- relevant water analyser maintenance procedures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practice in relation to arranging water analysis measuring and control instruments.
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0037 Set up weighting measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up weighting measuring and control instruments.

It includes working safely, following set-up procedures, testing and reporting activities.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to set up weighting measuring instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards that have not previously been identified are noted and risk control measures implemented
	1.4 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.5 Measurement parameters are identified by reviewing process requirements and instrument manufacturer instructions
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.7 Preparatory work is checked to ensure no damage has occurred and work is in accordance with relevant industry standards
	1.8 Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	1.9 Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Arrange weighting measuring instruments	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Testing/measuring devices are connected and arranged in accordance with relevant industry standards and control system
	2.3 Measuring instruments are arranged and adjusted in accordance with workplace procedures and instrument

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		manufacturer instructions
	2.4	Methods for dealing with unplanned situations are discussed with relevant person/s and documented
	2.5	Unplanned situations are dealt with safely and with approval of relevant person/s
	2.6	Work is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report arrangement activities	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Setting up and adjusting must include at least two of the following:	• weighting measuring instruments

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI118A Set up weighting measuring and control instruments.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0037 Set up weighting measuring and control instruments

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- arranging and adjusting measuring instruments in accordance with workplace procedures and manufacturer instructions
- carrying out work without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
- checking preparatory work to ensure no damage has occurred
- consulting with relevant person/s to coordinate with others
- dealing with unplanned situations by discussing with relevant person/s and documenting in accordance with WHS/OHS requirements
- documenting adjustment settings and notifying relevant person/s in accordance with workplace procedures
- identifying measurement parameters
- obtaining and checking tools, equipment and testing devices
- preparing weighting measuring instruments
- testing and measuring live circuits in accordance with WHS/OHS and workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- methods of weighing and common factors affecting weighting system performance
- methods of weighing materials in motion
- principles of operation of various load cells in common use
- principles of strain gauge measurement
- problem-solving techniques

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- relevant circuits/machines/plant
- relevant industry standards
- relevant isolation procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant materials, apparatus, environment and services
- relevant measurement parameters
- relevant measuring instruments
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles
- weighing and the relationship between force and weighing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational suitable situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices setting up weight measuring and control instruments
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0038 Solve problems in density/level measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up density/level measurement components and systems and provide solutions to a problem as it applies to a process and control work function.

It includes working safely, setting up and calibrating density/level measuring components and systems, applying problem-solving techniques, using of a range of measuring devices, and providing solutions derived from measurements and calculations to problems in density/level measurement components and systems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to work on density/level measurement components and system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 Hazards are identified, risks assessed and control measures implemented
	1.3 Nature of the density/level measurement problem is identified from documentation or appropriate person/s to determine the scope of work to be undertaken
	1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others
	1.5 Materials required for the work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Solve density/level measurement problems	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
	2.2 Need to inspect, test or measure electrical components of live electrical work is determined in accordance with job requirements and workplace safety procedures
	2.3 Density/level measurement apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Relevant methods are used to solve measurement problems from tests and calculated values as they apply to density/level measurement systems
	2.5 Unplanned situations are responded to in accordance with workplace procedures and with the approval of an authorised person/s
	2.6 Problems are resolved using sustainable energy principles and without damage to apparatus, the surrounding environment or services in accordance with workplace procedures
3 Complete work and	**3.1** WHS/OHS work completion risk control measures and

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document work activities		workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve density/level measurement problems is documented
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Density/level measurement apparatus and system, fault finding, maintenance or development work functions must include at least three of the following:	• determining the operating parameters of a density/level measuring system • setting up and calibrating a density/level measuring system • altering an existing density/level measuring system to comply with specified operating parameters • developing a density/level measuring system to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI103A Solve problems in density/level measurement components and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0038 Solve problems in density/level measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including applying safe working practices
- applying sustainable energy principles and practices
- cleaning and making work site safe
- completing work and documenting work activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting completed work
- implementing risk control measures
- obtaining tools, equipment and testing devices
- determining work on density/level measurement components and systems
- solving density/level measurement problems
- solving problems in density/level measurement systems
- working with density/level apparatus.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- introduction to level/density measurement. including:
  - definitions density and relative density (sg)
  - application
  - factors affecting density
  - density measurement
  - Archimedes principle
  - density calculations

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  - types and applications of level/density transducers
  - transducers input/outputs (I/O) - measurement and evaluation
  - transducer connections
- level/density measurement techniques sight type, including:
  - dipstick and hook gauges
  - tubular and flat glass gauges
  - accuracy of flat glass gauges
  - magnetically coupled gauges
  - float level measuring devices
  - application of float devices
- level/density measurement - force type techniques, including:
  - comparison of float and displacement type systems
  - interface sensing devices
  - torque tube type displacer operation
  - torque tube type displacer construction
  - pneumatic and electronic transmitters
- level/density measurement - pressure-type techniques, including:
  - diaphragm level detectors
  - applications of diaphragm level detectors
  - differential pressure cells advantages and disadvantages
  - density measurement using D/P cells
- level/density measurement - electrical type techniques, including:
  - application of conductance probes
  - operation of a conductivity-level controller
  - resistance tapes level detectors
  - capacitance probes level detectors
  - ultrasonic level detectors
  - microwave-based level detectors
  - nucleonic-type level sensors
  - load cells used for level measurement
- level/density measurement - non-intrusive type techniques, including:
  - radiation-type density sensor
  - hydrometer element used for density measurement
  - vibrating tube type liquid density meter
- level/density measurement calibration for:
  - D/P cell calculations
  - D/P calibration
  - open tank installation level measurement
- problem solutions in density/level measurement systems
- relevant job safety assessments or risk mitigation processes, including risk control measures

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- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- safe working practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0039 Solve problems in flow measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in flow measurement components and systems.

It includes identifying and solving problems in flow measurement components and systems as they apply to various processes and control work functions. It also includes working safely and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on flow	**1.1** Work health and safety (WHS)/occupational health and

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measurement components and system		safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2	Hazards are identified, risks assessed and control measures implemented
	1.3	Nature of the flow measurement problem is identified from documentation and/or appropriate person/s to determine the scope of work to be undertaken
	1.4	Appropriate person/s is consulted to ensure work is coordinated effectively with others
	1.5	Materials required for the work are determined in accordance with workplace procedures
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Solve a flow measurement problems	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Need to inspect, test or measure electrical components of live work is determined in accordance with job requirements and workplace safety procedures
	2.3	Flow measurement apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Relevant methods/techniques are used to solve measurement problems and calculated values as they apply to flow measurement systems
	2.5	Unplanned situations are responded to in accordance with workplace procedures and with the approval of an authorised person/s
	2.6	Problems are resolved using sustainable energy principles and without damage to apparatus, the surrounding environment or services in accordance with workplace procedures
3 Complete work and document work activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Justification for solutions used to resolve flow measurement problem is documented

3.4 Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Flow measurement apparatus and system fault finding, maintenance or development work functions must include at least three of the following:

- determining the operating parameters of a flow measuring system
- setting up and calibrating a flow measuring system
- altering an existing flow measuring system to comply with specified operating parameters
- developing a flow measuring system to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI104A Solve problems in flow measurement components and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0039 Solve problems in flow measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe work practices
  - implementing risk control measures
- applying sustainable energy principles and practices
- completing work and documenting work activities
- connecting pneumatic, hydraulic and electric equipment
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying flow measurement components and system
- identifying specifications, industry standards and equipment manuals
- solving problems in flow measurement systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- introduction to flow measurement in closed conduits, including:
  - basic principles of fluid flow
  - International System of Units (SI) units pertaining to flow and conversion factors to SI units
  - volumetric and mass flow
  - Reynolds numbers
  - behaviour of fluid flow in pipes
  - correction methods
  - flow terminology

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  - pressure loss
  - integration
  - uses of flow meters
  - types and applications of flow transducers
  - transducers input/outputs - measurement and evaluation
  - transducer connections
- differential pressure flow measurement, including:
  - Bernoullis theorem and square root head law
  - calculations of the differential pressure
  - calibration of the associated secondary instrument
  - installation and types of differential pressure flow meters and primary elements
- differential pressure flow measurement circuits, including define turndown and accuracy, output signals, square root extractors, scaling factors and signal scaling
- electromagnetic, vortex and ultrasonic flow meters, including:
  - construction, operating principles, performance, application and installation
  - installation of vortex and ultrasonic flow meters
  - operating principles and applications of ultrasonic flow meters
- flow measurement in closed conduits, including:
  - basic principles of fluid flow
  - behaviour of fluid flow in pipes
  - correction methods and flow terminology
  - integration, pressure loss, and Reynolds numbers
  - SI units pertaining to flow and conversion factors to SI units
  - types and applications of flow transducers, connections, and transducer input/outputs (I/O) - measurement and evaluation
  - uses of flow meters
  - volumetric and mass flow
- mass flow measurement and volumetric flow rate correction, including:
  - applications, installation, operating principles and performance of mass flow meters
  - calculations of corrected flow rate
  - calibration of corrected systems components
  - mass flow measurement
  - volumetric flow rate correction
- mechanical flowmeters for liquid service, including:
  - operating principles of mechanical flow meters
  - performance of mechanical flow meters
  - applications of mechanical flow meters
  - installation of mechanical flow meters
  - operating principles of gas flow meters
  - performance of gas flow meters

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  - applications of gas flow meters
  - installation of gas flow meters
- open-channel flow measurement and flow meter calibration, including:
  - calculations of the head generated
  - flow meter calibration
  - installation of open channel flow meters
  - non-linear head/flow relationships
  - open channel flow measurement
  - operating principles of secondary instruments
  - principles of fluid flow in open channels
  - principles of head/flow relationships
- problems in flow measurement systems
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures, including safe work practices
- specifications, industry standards and equipment manuals
- sustainable energy principles and practices
- variable area flow meters and turbine flow meters, including;
  - applications, installation, and operating principles and performance of variable area and turbine meters
  - density correction calculations and scaling factors
  - variable area meters performance factors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0040 Solve problems in polyphase electronic power control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in polyphase electronic power control circuits.

It includes preparing and solving problems in polyphase electronic power control circuits. It also includes testing and documenting solutions.

Typical polyphase electronic power control problems are those encountered in meeting performance requirements and industry compliance standards, revising control operating parameters and dealing with control malfunctions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

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UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

UEEIC0020 Fault find and repair analogue circuits and components in electronic control systems

UEEIC0042 Solve problems in single phase electronic power control circuits

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify problems in polyphase electronic power control circuits	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 Extent of polyphase electronic power control problems are determined from performance specifications, situation reports and consultations with relevant person/s
	1.4 Work activities are planned to meet scheduled timelines in consultation with relevant person/s

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	1.5	Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Solve problems in polyphase electronic power control circuits	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Polyphase electronic power control devices, circuit operation characteristics and applications are applied to developing solutions to control problems
	2.3	Parameters, specifications and performance requirements in relation to each polyphase electronic power control problem are obtained in accordance with workplace procedures
	2.4	Solutions to polyphase electronic power control problems are evaluated to determine most effective resolution
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Problems are resolved using sustainable energy practices and principles without wasting materials, damaging apparatus, the surrounding environment or services in accordance with workplace procedures
3 Test and document solutions to polyphase electronic power control problems	**3.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	3.2	Solutions to polyphase electronic power control problems are tested to determine effectiveness and modified, as required
	3.3	Solutions are documented, including instructions for implementation, incorporating risk control measures
	3.4	Solutions used to solve polyphase electronic power control problems are justified and documented in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving electrical problems in polyphase electronic power control circuits must include at least four of the following:	• polyphase electronic power control circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI149A Solve problems in polyphase electronic power control circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0040 Solve problems in polyphase electronic power control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining the extent of the polyphase electronic power control problem
- developing, evaluating and testing solutions to polyphase electronic power control problem
- documenting justification of solutions implemented in accordance with workplace procedures
- following scheduled timeframes
- obtaining electronic device and circuit parameters, specifications and performance requirements appropriate to each problem
- resolving problems in polyphase electronic power control circuits
- testing and documenting solutions to polyphase electronic power control circuits.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- job safety assessments or risk mitigation processes, including risk control measures
- three phase rectifier circuits, including:
  - three phase circuit configurations
  - resistive/inductive loads
  - output voltages/waveforms
  - ripple voltage/frequency
  - peak reverse voltages
  - freewheeling diodes

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  - measurement of rectifier output parameters
- three phase half wave-controlled rectifiers, including:
  - phase control
  - purpose/operation of half wave-controlled rectifiers
  - circuit configuration
  - rectifier performance and operation - resistive loads
  - output voltage resistive load
  - rectifier performance and operation - inductive loads
  - rectifier output waveforms
  - applications and limitations
  - advantages and disadvantages three phase half wave-controlled rectifiers
- three phase half-controlled bridge rectifier, including:
  - purpose/operation of a half-controlled bridge rectifiers
  - circuit configuration and connections
  - rectifier output - resistive loads
  - output voltage resistive loads
  - rectifier output - inductive loads
  - output voltage - inductive loads
  - flywheel diode
  - output voltage calculations
  - applications and limitations
  - advantages and disadvantages three phase half-controlled bridge rectifiers
- three phase fully controlled bridge rectifier, including:
  - purpose/operation of a fully controlled bridge rectifiers
  - circuit configuration and connections
  - rectifier output - resistive loads
  - output voltage resistive loads
  - rectifier output - inductive loads
  - output voltage - inductive loads
  - flywheel diode
  - output voltage calculations
  - applications and limitations
  - advantages and disadvantages three phase fully controlled bridge rectifiers
- three phase alternating current (a.c.) controllers, including:
  - circuit configurations
  - circuit operation
  - triacs and silicon controlled rectifier (SCR) circuits
  - triggering requirements
  - output voltage and waveforms

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  - determination of output voltage
  - applications
  - advantages and disadvantages
- direct current (d.c.) converters, including:
  - purpose and operation of d.c. converters
  - circuit configurations
  - voltage control methods
  - forced commutation methods
  - calculation of load voltage
  - output voltage/waveforms
  - applications
  - advantages and disadvantages
- cyclo-converters, including:
  - purpose/operation of a cyclo-converter
  - basic circuit configurations
  - measurement of output voltage
  - calculation of load voltage
  - output voltage/waveforms
  - applications and limitations
  - advantages and disadvantages
- inverters, including:
  - purpose/operation of an inverter
  - basic circuit configurations
  - measurement of inverter outputs
  - output voltage
  - applications and limitations
  - advantages and disadvantages
- thyristor protection, including:
  - power control devices failure
  - protection techniques
  - snubber networks
  - series inductors
  - amp trap high rupturing capacity (HRC) fuses
  - gate pulse suppression
- installation of thyristor devices and circuits, including:
  - need for heat sinking of power thyristor devices
  - heat sink features and types
  - installation methods for all types of thyristor packages
  - basic thermal model, only to demonstrate the effect of different heat sink

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    - types and profiles and installation methods on thyristor junction temperature
- series and parallel thyristor connections, including:
    - purpose of series/parallel connection
    - series connections
    - reasons
    - operational problems
    - parallel connections
    - reasons
    - operational problems
- fault finding three phase thyristor circuits, including:
    - fault finding procedures
    - typical faults power and trigger circuits
    - characteristics displayed by common faults
    - comparison of test data with expected data (voltage/current waveforms)
    - location and replacement of faulty components
- problem-solving techniques
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0041 Solve problems in pressure measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up pressure measuring components and systems and provide solutions to a pressure measurement problem as it applies to a process and control work function.

It includes working safely, setting up and calibrating pressure measuring components and system, using problem-solving techniques, using measuring devices, and providing solutions derived from measurements and calculations to predictable problems in pressure measurement components and systems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to work on pressure measurement components and system**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
		1.2 Hazards are identified, risks assessed and control measures implemented
		1.3 Nature of the pressure measurement problem is identified from documentation or appropriate person/s to determine the scope of work to be undertaken
		1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others
		1.5 Materials required for the work are determined in accordance with workplace procedures
		1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2	**Solve a pressure measurement problem**	**2.1** WHS/OHS risk control work measures and workplace procedures are followed
		2.2 Need to inspect, test or measure electrical components of live work is determined in accordance with job requirements and workplace safety procedures
		2.3 Pressure measurement apparatus is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4 Relevant methods are used to solve measurement problem from tests and calculated values, as they apply to pressure measurement components and systems
		2.5 Unplanned situations are responded to in accordance with workplace procedures and with the approval of an authorised person/s
		2.6 Problems are resolved using sustainable energy principles and without damage to apparatus, the surrounding environment or services in accordance with workplace procedures
3	**Complete work and document work activities**	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to resolve pressure measurement problem is documented

3.4 Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Pressure measurement apparatus and system fault finding, maintenance or development work functions must include at least three of the following:	• determining the operating parameters of a pressure measuring system • setting up and calibrating a pressure measuring system • developing a pressure measuring system to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI102A Solve problems in pressure measurement components and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0041 Solve problems in pressure measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including applying risk control measures
- applying sustainable energy principles and practices
- completing work and documenting work activities
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting completed work
- identifying pressure measurement components and systems
- solving problems in pressure measurement components and systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- pressure transmitters and converters
- pressure measurement terms and transducers, including:
  - applications and common relationships
  - pressure and the relationship between applied pressure, density, mass, force, area and the height of liquid columns
  - transducer types, applications, connections and input/outputs (I/O) - measurement and evaluation
- manometers ,including:
  - types of manometers
  - operating principles of manometers
  - gauge pressure measurement
  - wet leg

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  - manometer applications
  - manometer limitations
- absolute, gauge and atmospheric pressure measurement, including:
  - absolute and gauge pressure
  - absolute zero pressure
  - atmospheric pressure
  - barometers
  - absolute pressure gauges
- mechanical pressure measuring devices, including:
  - gauges: bourdon tube, spiral and helical
  - other mechanical pressure elements: bellows, capsule and slack/stiff diaphragms
  - pressure measurement using elastic deformation gauges
  - term: flexibility spring rate
- electrical pressure measuring devices, including:
  - electrical sensors for pressure measurements, including capacitive, piezo, inductive and strain gauge
  - testing elements and electrical signal transmission devices
- dead weight testers, including:
  - law of hydraulics
  - dead weight tester operating principles
  - dead weight tester operating procedures
  - terms: backlash, hysterics and repeatability
  - calibration of gauges
  - precautions
  - bourdon tube gauges calibration
- testing and installation of pressure measurement devices, including:
  - testing
  - calibration
  - installation of pressure measurement devices within pressure vessel systems
  - isolation, seal, vent, drain and bypass valves location and operation sequence
- pressure transmitters and converters, including:
  - principle of operation of moment, motion and forced balanced transmitters for pneumatic, electrical, and electronic transmitter
  - applications of transmitters, converters and connections
  - calibration of transmitters
  - principle of operation of signal converters
  - applications of pressure converters
  - calibration of pressure converters
- problem solutions in pressure measurement systems
- relevant job safety assessments or risk mitigation processes, including risk control measures

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- relevant manufacturer specifications
- relevant materials, tools and equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- testing and installation of pressure measurement devices, including device calibration
- live electrical components.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0042 Solve problems in single phase electronic power control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in single phase electronic power control circuits.

This unit includes preparing and solving problems in single phase electronic power control systems. It also includes testing and documenting solutions to single phase electronic power control.

Typical single phase electronic power control problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with control malfunctions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

Where prerequisite pathways have been identified, all competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s)

Common Unit Group

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

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UEECD0046 Solve problems in single path circuits

Electrotechnology Pathway Group

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0067 Troubleshoot basic amplifier circuits

UEEEC0065 Solve problems in basic electronic circuits

Electronics and Communications Pathway Group

UEEEC0060 Repairs basic electronic apparatus faults by replacement of components

UEEEC0074 Troubleshoot resonance circuits in an electronic apparatus

UEEEC0067 Troubleshoot basic amplifier circuits

Electrical Pathway Group

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0003 Arrange circuits, control and protection for electrical installations

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

UEEEL0025 Test and connect transformers

Instrumentation and Control Pathway Group

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0045 Solve problems in multiple path extra-low voltage (ELV) a.c. circuits

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

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UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify problems in single phase electronic power control system	**1.1** WHS/OHS requirements and workplace procedures are identified and applied
	1.2 Hazards are identified, risks are assessed and control measures implemented
	1.3 Extent of single phase electronic power control problems are determined from performance specifications, situation reports and consultations with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with relevant person/s
	1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Solve problems in single phase electronic power control system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Single phase electronic power control devices, circuit operation characteristics and applications are used to develop solutions for control problems
	2.3 Parameters, specifications and performance requirements in relation to each single phase electronic power control problem are obtained in accordance with

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		workplace procedures
	2.4	Approaches to resolving single phase electronic power control problems are evaluated to provide most effective solutions
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Problems are solved efficiently using sustainable energy practices without waste of materials, damaging apparatus, the surrounding environment or services in accordance with workplace procedures
3 Test and document solutions to single phase electronic power control	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Solutions to single phase electronic power control problems are tested to determine effectiveness and modified as necessary
	3.3	Adopted solutions are documented, including instructions for implementation, incorporating risk control measures
	3.4	Justification for solutions used to solve single phase electronic power control problems are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving electrical problems must include at least four of the following:	• single phase electronic power control systems

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEI148A Solve problems in single phase electronic power control circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0042 Solve problems in single phase electronic power control circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- evaluating problem resolutions, testing for effectiveness and modifying as required
- meeting scheduled timelines
- preparing and solving problems in single phase electronic power control systems
- using tools, equipment and testing devices
- obtaining and checking tools and equipment
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- introduction to power control, including:
  - advantages and benefits of power control
  - need for power control and typical applications
  - power control methods
  - types of solid-state switches
  - block diagram of a power converter
  - power control terminology
  - modes of operation
- single phase power rectifiers, including:
  - single phase rectifier circuit configurations
  - resistive/inductive loads

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  - output voltages/waveforms
  - ripple voltage frequency
  - peak reverse voltages
  - freewheeling diodes
- silicon controlled rectifiers (SCRs), including:
  - construction and symbol
  - basic operating principles
  - characteristics
  - gate requirements
  - commutation
  - electrical ratings
  - testing SCRs
  - applications
- triacs and gate turn off (GTO) thyristors, including:
  - triac construction and symbol
  - triac basic operating principles
  - triac characteristics
  - triac triggering modes
  - triac electrical ratings
  - triac testing
  - GTO construction and symbol
  - GTO basic operating principles
  - GTO characteristics
  - GTO electrical ratings
  - applications for triac and GTOs
- power transistors bipolar junction transistor (BJT), including:
  - BJT construction and symbol
  - BJT basic operating principles
  - BJT characteristics
  - BJT electrical ratings
  - BJT testing
  - applications for BJTs
- power field effect transistors (FET), including:
  - types of FETs used for power control
  - power FETs construction and symbol
  - FET basic operating principles and characteristics
  - insulated gate bipolar transistor (IGBT) basic operating principles and characteristics
  - power FET electrical ratings
  - power FET Testing

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  - applications for power FETs
- triggering devices diac, including:
  - construction and symbol
  - operating principles
  - breakover voltage
  - unijunction transistors (UJTs)
  - construction and symbol
  - operating principles
  - intrinsic stand-off ratio and peak point voltage
- programmable unijunction transistors (PUTs) including:
  - construction and symbol
  - operating principles
  - programmable standoff ratio
  - peak point voltage
- triggering circuits, including:
  - R-C time constant circuits
  - diac trigger circuit operation
  - UJT relaxation oscillator circuit operation
  - PUT relaxation oscillator circuit
- half wave-controlled rectification, including:
  - phase shift control
  - controlled rectifiers
  - controlled rectifier power output control
  - single phase half wave-controlled rectifier
  - circuit configuration
  - circuit operation
  - waveforms
  - load voltage
  - applications and limitations
  - problems associated with phase shift control
- full wave-controlled bridge rectification including:
  - single phase full wave-controlled bridge rectifier circuit
  - output voltage
  - output waveforms
  - applications and limitations
  - advantages and disadvantages
- fully controlled bridge rectification, including:
  - single phase fully controlled rectifier bridge circuit
  - output voltage

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  - output waveforms
  - applications and limitations
  - advantages and disadvantages
- single phase alternating current (a.c.) voltage control, including:
  - phase control of a.c. power
  - circuit configurations - half and full control circuits
  - triggering circuits
  - circuit performance and operation on resistive and inductive loads
  - output voltage and waveform, determination of output voltage using circuit characteristics
  - range of control with inductive loads
  - triggering problems associated with inductive loads
  - applications and limitations
- zero voltage switching (ZVS), including:
  - operating principles
  - circuit configuration, including trigger circuits
  - circuit operation and waveforms resistive loads only
  - relationship between load power and conduction time
  - solid state relays: types and ratings
  - applications and limitations
- fault finding of power control circuits, including:
  - fault-finding procedures
  - typical faults power and trigger circuits
  - characteristics displayed by common faults
  - comparison of test data with expected data (voltage/current waveforms)
  - location and replacement of faulty components
- job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- single phase electronic power control circuits
- solutions to single phase electronic power control problems
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0043 Solve problems in temperature measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in temperature measurement components and systems as they apply to various processes and control work functions.

It includes working safely, setting up and calibrating temperature measuring components and systems, applying problem-solving techniques, using a range of measuring devices, and providing solutions derived from measurements and calculations to predictable problems in temperature measurement components and systems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to work on temperature measurement components and system**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
		1.2 Hazards are identified, risks assessed and control measures implemented
		1.3 Nature of the temperature measurement problem is identified from documentation or appropriate person/s
		1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others affected by the work
		1.5 Materials required for work are determined in accordance with workplace procedures
		1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2	**Solve temperature measurement problem**	**2.1** WHS/OHS risk control work measures and procedures are followed
		2.2 Need to inspect, test or measure live electrical components is determined in accordance with WHS/OHS regulatory requirements and workplace procedures
		2.3 Temperature measurement apparatus is checked and isolated in accordance with workplace procedures
		2.4 Relevant methods are used to solve measurement problem from tests and calculated values as they apply to flow measurement components and systems
		2.5 Unplanned situations are responded to in accordance with workplace procedures and approval of an authorised person/s
		2.6 Problem is solved using sustainable energy principles and without damaging apparatus, the surrounding environment or services in accordance with workplace procedures
3	**Complete work and document work activities**	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2 Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Justification for solutions to resolve flow measurement problems is documented

3.4 Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

temperature measurement apparatus and systems as they apply to installation, fault finding, maintenance or development work functions must include at least three of the following:	• determining the operating parameters of a temperature measuring system • setting up and calibrating a temperature measuring system • altering an existing temperature measuring system to comply with specified operating parameters • developing a temperature measuring system to comply with a specified function and operating parameters

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI105A Solve problems in temperature measurement components and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0043 Solve problems in temperature measurement components and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying risk control measures
  - applying safe working practices
- applying sustainable energy principles and practices
- completing work and documenting work activities
- coordinating work with others
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying sources of materials
- obtaining tools, equipment and testing devices
- preparing to work on temperature measurement components and systems
- solving problems in temperature measurement components and systems
- solving temperature measurement problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- introduction to temperature measurement, including:
  - temperature measurement terms
  - international temperature scale
  - temperature scales
  - conversion of temperature readings
  - temperature measuring elements
  - temperature sensor selection factors

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  - errors in temperature measurement
  - methods used to reduce errors.
  - types and applications of temperature transducers
  - transducers input/outputs - measurement and evaluation
  - transducer connections
- filled system thermometers, including:
  - applications of filled system thermometers
  - calibration of filled systems
  - filled systems operating principles
  - liquid in glass thermometers construction
- other temperature measuring techniques, including:
  - thermistor characteristics and circuit operation
  - thermistor temperature measuring circuits and operation
  - temperature measurement characteristics of solid-state devices and circuits
  - temperature indicators: characteristics and applications
  - liquid crystals
  - thermometers: bimetallic and digital thermistor
- problems in temperature measurement components and systems
- radiation thermometers, including:
  - operating principles, terms and factors affecting its use
  - construction, signal conditioning, and calibration of optical pyrometers and radiation
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes, including risk control measures and safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- resistance temperature detectors (RTDs) and RTD measuring circuits, including:
  - calculating of unbalanced Wheatstone bridge circuits voltage outputs
  - determining RTD standard resistance values or temperature
  - non-linear voltage output compensation methods
  - RTD lead-resistance compensation methods and immersion errors
  - selecting RTD configurations and terms
- sustainable energy principles and practices
- temperature measurement principles, including:
  - terms and international temperature scales, temperature conversions, measuring elements, sensor selection factors, errors in temperature measurement and methods used to reduce them
  - types and applications of temperature transducers, connections, input/outputs (I/O), and measurement and evaluation
- thermocouple measuring circuits, including:

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- advantages and disadvantages and the characteristics of thermocouples and connection wires
- calibrating and determining thermocouple measuring instruments, test equipment and junction temperature configurations
- electromagnetic field distribution in thermocouple circuits
- handling and selection of thermocouples, including installation errors
- identification of thermocouple connection wires
- industrial thermocouple assembly and fabrication methods
- thermo-electric effects, principles and laws
- thermowell properties

- relevant industry standards, regulations and codes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0044 Troubleshoot measuring and analysis systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot measuring and analysis systems.

It includes working safely, checking and testing faulty components, reading circuit diagrams and device specifications, applying fault-finding procedures, conducting repairs and completing service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEIC0048 Verify compliance and functionality of instrumentation and control installations

and

UEEIC0037 Set up weighting measuring and control instruments

or

UEEIC0033 Set up gas analysis measuring and control instruments

or

UEEIC0036 Set up water analysis measuring and control instruments

or

UEEIC0035 Set up scientific analysis measuring and control instruments

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and repair faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Scope of measuring and analysis systems fault is obtained from documentation and/or work supervisor
	1.4 Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find and repair faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is inspected and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding of measuring and analytical equipment and circuit is conducted using measured and calculated values of apparatus parameters in accordance with workplace procedures
	2.5 Equipment components are dismantled, as required, and parts stored to protect against loss or damage in accordance with workplace procedures and relevant industry standards
	2.6 Faulty components are rechecked and fault status confirmed

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	2.7 Faulty components are readjusted or replaced in accordance with workplace procedures
	2.8 Repaired components are tested in accordance with workplace procedures
	2.9 Apparatus is reassembled, inspected, tested and prepared for return to service
	2.10 Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.11 Fault-finding and repair activities are carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2 Work area is cleaned and made safe in accordance with workplace procedures
	3.3 Written justification is made for repairs to apparatus, components and materials in accordance with workplace procedures
	3.4 Acceptance that the reported fault/s have been repaired is sought from relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

finding and repairing faults must include the following:	• at least four faults • at least two different types of measuring and analytical equipment

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEI121A Trouble shoot in measuring and analysis systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0044 Troubleshoot measuring and analysis systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- completing repair activities
- dealing with unplanned situations safely and with the approval of relevant person/s
- determining need for inspecting, testing and measuring live work
- determining sources of materials required for work
- dismantling equipment components and storing to protect against loss or damage
- finding faults efficiently
- inspecting and isolating apparatus
- obtaining scope of measuring and analysis systems fault
- obtaining tools, equipment and testing devices and checking for correct operation and safety
- preparing to find and repair faults
- providing written justification for the repairs
- rechecking and confirming faulty component status
- replacing components without damage using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- isolation procedures
- problem-solving techniques
- relevant industry measuring and analysis systems standards
- relevant manufacturer specifications and operating instructions
- job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices

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- relevant troubleshooting, measuring and analysis systems, including:
  - applications of measurement circuits
  - circuit components and configurations
  - principles of measurement
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to finding and repairing faults in measuring and analysis systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0045 Troubleshoot medical equipment control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot medical equipment control systems.

It includes applying safe working practices, interpreting processes, applying knowledge of medical process controls to logical fault-finding procedures, conducting effective repairs, performing safety and functional inspection and testing, and completing service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and rectify faults in medical equipment control systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3	Scope of medical equipment control system fault is obtained from documentation and/or work supervisor to determine work
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Sources of materials required for work are identified in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find faults in medical equipment control systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Apparatus is inspected and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Fault finding of medical equipment control systems is conducted using measured and calculated system parameters values in accordance with workplace procedures
	2.5	Apparatus components are dismantled, as required, and parts stored to protect against loss or damage in accordance with workplace procedures and relevant industry standards
	2.6	Faulty components are rechecked and fault status confirmed
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
	2.8	Fault-finding activities are carried out without damage to apparatus circuits, the surrounding environment or services using sustainable energy principles
3 Rectify faults in medical equipment control systems	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	3.2 Apparatus is inspected and isolated in accordance with WHS/OHS and workplace procedures
	3.3 Materials required to rectify faults are sourced and obtained in accordance with workplace procedures
	3.4 Repairs are conducted without damage to relevant components or apparatus in accordance with workplace procedures and sustainable energy principles
	3.5 Repairs are tested in accordance with workplace procedures
	3.6 Apparatus is reassembled, inspected, tested and prepared for return to customer
4 Complete and report fault-finding and rectification activities	**4.1** WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2 Work area is cleaned and made safe in accordance with workplace procedures
	4.3 Written justification is made for repairs to apparatus
	4.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and rectifying faults must include at least two of the following:	• cardiovascular systems • respiratory systems • neurological systems • renal systems • medical imaging • physiological equipment

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- miscellaneous medical equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI115A Trouble shooting in medical equipment control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0045 Troubleshoot medical equipment control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- carrying out fault-finding activities without damage using sustainable energy principles
- completing and reporting fault-finding and rectification activities
- dealing with unplanned situations safely and with the approval of relevant person/s
- determining the need to inspect, test and measure live work
- dismantling apparatus components and storing to protect against loss or damage
- finding faults
- inspecting and isolating apparatus
- inspecting and testing reassembled apparatus
- obtaining scope of the medical equipment control system faults
- obtaining tools, equipment and testing devices
- preparing to find and rectify faults
- rectifying faults without damage
- providing written justification for the rectifications undertaken and notifying relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant isolation procedures
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant medical equipment principles and control systems, including medical equipment and

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systems and safe working practices, including:

- cardiovascular systems
- respiratory systems
- neurological systems
- renal systems
- medical imaging
- miscellaneous medical equipment
- physiological equipment
- medical equipment, anatomy and physiology and infection control

- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to finding and rectifying faults in medical equipment control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0046 Troubleshoot process control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to troubleshoot process control systems.

It includes applying safe working practices, interpreting process and circuit diagrams, applying knowledge of process controls to fault-finding procedures, conducting repairs, performing safety and functional testing, and completing service documentation.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

UEEIC0030 Set up and adjust advanced PID process control loops

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Scope of fault is obtained from documentation and/or from work supervisor to determine work
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Sources of materials required for work are identified in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Find faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Need to inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is inspected and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Fault finding of industrial processes, control apparatus and systems is conducted using measured and calculated values of system parameters in accordance with workplace procedures
	2.5 Apparatus components are dismantled, as required, and

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		parts stored to protect against loss or damage in accordance with workplace procedures
	2.6	Faulty components are rechecked and fault status confirmed
	2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s in accordance with workplace procedures
	2.8	Fault-finding activities are carried out without damage to apparatus circuits, the surrounding environment or services using sustainable energy principles
3 Rectify fault	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Apparatus is inspected and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3	Materials required to rectify faults are sourced and obtained in accordance with workplace procedures
	3.4	Repairs are conducted without damage to relevant components or apparatus in accordance with workplace procedures and sustainable energy principles
	3.5	Repairs are inspected and tested in accordance with workplace procedures and relevant industry standards
	3.6	Apparatus is reassembled, inspected, tested and prepared for return to customer in accordance with workplace procedures and relevant industry standard
4 Complete and report fault-finding and rectification activities	**4.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	4.2	Work area is cleaned and made safe in accordance with workplace procedures
	4.3	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and rectifying faults must include at least two of the following:

- different systems containing more than one control loop

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI114A Trouble shoot process control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0046 Troubleshoot process control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- completing and reporting fault-finding and rectification activities
- dealing with unplanned situations with the approval of relevant person/s
- dismantling apparatus components
- documenting work and notifying relevant person/s
- documenting work tasks and rectifications to workplace procedures
- identifying sources of materials required for work
- inspecting and isolating apparatus
- inspecting, testing and measuring live work
- measuring and calculating control apparatus and systems values of parameters to find faults
- obtaining the scope to the fault
- obtaining tools, equipment and testing devices to carry out work
- rectifying faults without damage
- using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- intermittent faults and relevant causes of intermittent faults
- effect to cause reasoning - assumptions of possible causes
- inspection and testing procedures
- isolation procedures
- methods for testing
- problem-solving techniques

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- relevant control apparatus and systems
- relevant factors and the nature of a fault
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instructions
- relevant measuring parameters
- relevant methods for testing assumptions
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace instructions, policies and procedures
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to finding and rectifying faults in process control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to use instrumentation drawings, specifications, industry standards and equipment manuals relevant to install, maintain and fault find process controls.

Process controls are a system dealing with mechanisms for maintaining the output of a specific process within a desired range. A process is predictable, stable and consistently operating at a target level of performance.

It includes applying principles of process control embodied in drawings, industry standards, specifications and equipment manuals; matching equipment with specifications for a given function; and locating and determining connections required between pneumatic, hydraulic and electrical equipment from instrumentation drawings and specifications.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Identify instrumentation drawings, specifications, industry standards and equipment manuals	**1.1** Work health and safety (WHS)/occupational health and safety (OHS), risk control measures and workplace procedures are followed
	1.2 Need for instrumentation drawings, specifications, industry standards or equipment manuals is determined for the work to be undertaken
	1.3 Instrumentation drawings, specifications, industry standards or equipment manuals required for the work to be undertaken are obtained in accordance with workplace procedures
2 Use instrumentation drawings, specifications, industry standards and equipment manuals	**2.1** Instrumentation drawings, specifications, industry standards and/or equipment manuals are selected appropriate to the work being undertaken
	2.2 Instrumentation drawings, specifications, industry standards and equipment manuals are interpreted using information from process controls, instrumentation drawing layouts, conventions and symbols
	2.3 Dimensions are extracted and applied from drawings and diagrams for application to work being undertaken
	2.4 Location of equipment is determined from instrumentation drawings and specifications
	2.5 Connections between pneumatic, hydraulic and electrical equipment are determined from instrumentation drawings and specifications
	2.6 Equipment manuals are reviewed to ascertain content, format and located information are relevant to the work to be undertaken
3 Convey instrumentation information using drawings and diagrams	**3.1** Drawing conventions are used in freehand drawing layouts to convey instrumentation information and ideas to others involved in the work to be undertaken
	3.2 Instrumentation drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement
	3.3 Corrected drawings are forwarded to appropriate

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person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Instrumentation assembly, installation, fault finding, maintenance or development work functions for least two different process control systems must include:	• instrumentation drawings • specification industry standards • equipment manuals

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI101A Use instrumentation drawings, specifications, standards and equipment manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including applying risk control measures
- conveying instrumentation information and ideas using drawings and diagrams
- determining connections between pneumatic, hydraulic and electrical equipment
- determining location of equipment from instrumentation drawings and specifications
- identifying and using instrumentation drawings, specifications, industry standards and equipment manuals
- interpreting instrumentation drawings, specifications, industry standards and equipment manuals for process controls and instrumentation drawing layouts, conventions and symbols
- sketching of instrumentation and control drawings
- using instrumentation drawings, diagrams and manuals
- using workplace conventions in freehand drawings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial instrumentation. including:
  - introduction to the purposes of measurement in industrial processes
  - instrument control loops
  - types of measurement in these processes
  - local and remote measurement
  - measurement signal methods
  - signal transmissions electrical standards
  - signal transmissions pneumatic standards
  - flow, temperature, pressure and other appropriate measurements
  - identification and purpose of instruments measuring processes directly and those

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measuring indirectly
    - instrumentation and control components: sensors, transducers, converters and transmitters
- instrument standards, including:
    - instrumentation standards
    - relationship between standards
    - using standards
    - fluids in process piping colour coding
    - instruments symbols
- instrumentation terminology and International System of Units (SI), including:
    - SI base units
    - SI derived units
    - scientific and engineering notation
    - SI prefixes
    - instrumentation metric units
    - non-standard SI units - kg/cm2, and so on
    - conversion of units
    - instrumentation terminology:
        - span
        - range
        - accuracy
        - precision
        - errors
        - zero
        - repeatability
        - sensitivity
        - hysteresis
- calibration of link and lever instruments, including:
    - principles of levers and links and calibration of indicator recorder instrument
    - calibration terms
    - calibrate a link and lever instrument
    - interpret calibration data so as to identify the types of error displayed by an instrument and whether the instrument is within its specified accuracy
    - interpretation of graphs and tables associated with instrumentation
- instrumentation safe working practices, including:
    - identification of instrumentation and control hazards
    - risk control measures for instrumentation work
    - risk assessment
- instrumentation drawings, diagrams and manuals, including:
    - electrotechnology drawing symbols for instrumentation and control (electrical/electronic circuits, instrument circuits/diagrams, programmable logic controller (PLC) diagrams,

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pneumatic and hydraulic)
- standards used in instrumentation drawings (ISA, ASME, Australian Standards (AS), and SAMA)
- drawings used in instrumentation - schematic, single line, wiring, PLC diagrams, process flow diagrams - brief instrument information, process loop diagrams - details, terminals and types of instruments
- manufacturers data sheets, manuals, specifications and test procedures - instrumentation manuals, catalogues and drawings, including:
  - interpretation of the specifications contained within instrumentation manuals, catalogues and drawings
  - interpretation of the test procedures contained within instrumentation manuals, catalogues and drawings
  - comparison of data presented in different forms for the same equipment.
  - identification of data relevant to instrumentation from a range of publicity material
  - extraction of information such as calibration, testing or installation procedures from manuals, specification sheets and drawings
- quantity take-offs and parts lists, including:
  - part numbers for components, assemblies and equipment
  - parts list for a specified project or installation from manuals, catalogues, specifications and drawings
  - list of equipment, required to undertake a specified project or installation, from manuals, catalogues, specifications and drawings
  - identification and extraction of a part number for an actual sample component or part from a manual, catalogue, specification and/or drawing
- sketching of instrumentation and control drawings, including:
  - sketching a schematic circuit diagram from a given circuit board layout diagram, wiring or installation drawing and installation or modification of a specified project using information contained within manuals
  - sketching a part or equipment layout needed to perform a specified task, such as installation or modification, from given manuals, catalogues, specifications and drawings
- principles of process control
- relevant instrument industry standards including fluids in process piping colour coding and instrument symbols
- relevant manufacturer specifications
- relevant safe work statements (SWMS)/job safety assessments or risk mitigation processes, including risk control measures and instrumentation safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including catalogues, drawings, manufacturer's data sheets, manuals, specifications and test procedures
- instrumentation manuals, catalogues and drawings
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0048 Verify compliance and functionality of instrumentation and control installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify compliance and functionality of instrumentation and control installations.

It includes preparing and conducting inspections and testing the instrumentation and control installation. It also includes reporting instrumentation and control inspection and test results.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEIC0047 Use instrumentation drawings, specifications, standards and equipment manuals

UEEIC0041 Solve problems in pressure measurement components and systems

UEEIC0038 Solve problems in density/level measurement components and systems

UEEIC0039 Solve problems in flow measurement components and systems

UEEIC0043 Solve problems in temperature measurement components and systems

UEEIC0029 Set up and adjust PID control loops

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UEEIC0030 Set up and adjust advanced PID process control loops

UEEIC0031 Set up and configure human-machine interface (HMI) and industrial networks

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test instrumentation and control installation	**1.1** WHS/OHS measures for the site are identified, obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Safety hazards not previously identified are noted and risk control measures implemented
	1.4 Documentation of installation is reviewed and implemented in accordance with relevant industry standards
	1.5 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on worksite
	1.6 Tools, equipment and testing devices are checked for correct operation and safety in accordance with workplace procedures and relevant industry standards

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	1.7	Preparatory work is checked to ensure no damage has occurred and work is in accordance with relevant industry standards
2 Visually inspect instrumentation and control installation	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to visually inspect, test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	2.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Instrument cabling and tubing are checked for suitability of the environments to be installed and protected from damage in accordance with workplace procedures
	2.5	Type, configuration/sizing of instrument cabling and tubing is confirmed for the installation in accordance with relevant industry standards and workplace procedures
	2.6	Control apparatus and installation requirements are cited in accordance with WHS/OHS requirements and relevant industry standards
	2.7	Marking of control apparatus is checked for accuracy and clarity in accordance with relevant industry standards
3 Conduct functional and safety testing	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	3.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
	3.3	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.4	Process control apparatus is operated at low voltage (LV) arrangements to conduct and report on electrical safety tests in accordance with WHS/OHS requirements and workplace procedures

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	3.5	Insulation and continuity tests are conducted on process control cabling operating at extra-low voltage (ELV) in accordance with WHS/OHS requirements and workplace procedures
	3.6	Process control tubing/piping is pressure tested in accordance with WHS/OHS requirements and workplace procedures
	3.7	Functional inspections and tests are conducted on process control apparatus in accordance with workplace procedures and relevant industry standards
4 Report instrumentation and control inspection and test findings	**4.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	4.2	Worksite is cleaned and made safe in accordance with workplace procedures
	4.3	Non-compliance defects are identified and reported in accordance with workplace procedures
	4.4	Recommendations for rectifying defects are made in accordance with workplace procedures
	4.5	Verification documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying compliance and functionality must include the following:	• at least one electrical/electronic installation
	• at least one pneumatic process control installation comprising of:
	  • a measuring transmitter
	  • controller

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- final control element
- indicator
- cabling/tubing

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI112A Verify compliance and functionality of instrumentation and control installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0048 Verify compliance and functionality of instrumentation and control installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - using risk control measures
- checking accuracy and clarity of control apparatus marking
- checking and isolating circuits/machines/plant
- checking for correct operation of tools, equipment and testing devices
- checking instrument cabling and tubing for non-compliance defects
- checking preparatory work to ensure no damage has occurred and work is in accordance with relevant industry standards
- completing verification documentation
- confirming instrument cabling and tubing, type and configuration/sizing for installation
- identifying defects of non-compliance and recommending rectifying defects
- identifying non-compliance results
- preparing instrumentation and control installations
- reviewing control apparatus and installation requirements
- testing and measuring live circuits
- using effective methods for conducting inspections and tests
- visually inspecting instrumentation and control installation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- problem-solving techniques
- relevant circuits/machines/plant
- relevant control installations to industry standards
- relevant inspection and test methods

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- relevant inspection, test and measurement methods for live work
- relevant instrument cabling and tubing for installation
- relevant isolation procedures
- relevant manufacturer specifications and operating instructions
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including
  - verification and compliance industry standards
- relevant workplace instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to verifying compliance and functionality of process control installations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0049 Manage instrumentation and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage instrumentation and control projects.

It includes managing safety, budget variation, personnel, resources and critical path timelines; implementing project plan strategies; identifying measurable outcomes; managing conflict; monitoring procurement and completing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine scope of instrumentation and control project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Project deliverables and budget are determined from project planning and/or relevant documentation and

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		discussions with relevant person/s
	1.3	Measurable outcomes are identified to evaluate project on completion from project planning and relevant documentation
	1.4	Plant, materials and skills required to meet project outcome are determined from project planning and relevant documentation
	1.5	Processes are developed to manage contract variations from discussions with relevant person/s in accordance with contractual agreement and workplace procedures
2 Manage project	**2.1**	WHS/OHS requirements, workplace procedures and programs are implemented and monitored
	2.2	Achievement of project outcome is delegated to relevant person/s involved in project
	2.3	Risk events are identified and project plan strategies implemented to ensure standard of quality outcomes are achieved in accordance with WHS/OHS requirements and contractual agreement
	2.4	Procurement processes are monitored to ensure timely supply of plant and materials in accordance with workplace procedures and project plan
	2.5	Project progress is monitored in accordance with schedule, quality requirements and budget
	2.6	Conflict issues on worksite between stakeholders, clients and regulators are identified and managed in accordance with workplace procedures
	2.7	Variations are managed in accordance with workplace procedures and project plan
	2.8	Project records are maintained, progress reports written and forwarded to relevant person/s
3 Complete instrumentation and control project	**3.1**	Project outcomes are reviewed in accordance with project scope, implemented risk strategies, contract variations, safety record and budget
	3.2	Project completion acceptance is sought from relevant person/s and handover documented in accordance with workplace procedure

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEI134A Manage instrumentation and control projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0049 Manage instrumentation and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- adopting risk management strategies
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- completing project
- delegating achievement of project outcomes
- determining plant, materials and skills required to meet project outcomes
- determining project deliverables and budget
- developing processes manage contract variations
- identifying and managing conflicts
- identifying measurable outcomes
- maintaining records and submitting progress reports
- managing resources and variations
- monitoring procurement processes
- monitoring project progress in accordance with schedule, quality requirements and budget.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant instrumentation and control project management, including:
  - communication management
  - control system industry sector customs and practices
  - customer/client relations
  - defining project parameters
  - financial management
  - human resource management

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  - physical resource management
  - procurement management
  - quality management
  - risk management and contingencies
  - time management
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - project records
  - contracts
- relevant workplace quality, instructions, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to managing instrumentation and control projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEEIC0050 Plan instrumentation and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan instrumentation and control projects.

It includes applying critical path analysis; developing workflow strategies; and documenting, presenting and negotiating budgets and timelines.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Instrumentation & Control

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to plan project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Techniques for project planning are reviewed and adopted in accordance with workplace procedures
	1.3 Instrumentation and control project is determined from design brief specification and/or relevant documentation

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		and in discussions with relevant person/s
2 Develop project plan proposal	**2.1**	Estimated plant, material, labour and relevant costs are sought and obtained from relevant person/s in accordance with workplace procedures
	2.2	Project budget is determined from estimated plant, material, labour and relevant costs in accordance with workplace procedures
	2.3	Critical path analysis is applied to developing workflow strategies
	2.4	Sources and availability of materials and human resources required for project are determined in accordance with workplace procedures
	2.5	Risk management strategies are sought and obtained in accordance with project plan
	2.6	Project plan is reviewed against inputs and adjusted to rectify any anomalies
	2.7	Project plan proposal is documented in accordance with workplace procedures
3 Obtain approval for project plan	**3.1**	Project plan is presented and discussed with relevant person/s
	3.2	Alterations to the project plan from presentation/discussion are negotiated with relevant person/s in accordance with workplace procedure
	3.3	Final project plan is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEI135A Plan instrumentation and control projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEEIC0050 Plan instrumentation and control projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
- determining and adopting project planning techniques
- developing effective workflow strategies
- developing project plan proposal
- documenting project plan proposal
- establishing a project budget estimating plant, material, labour and related costs
- negotiating alterations to proposed project plan
- obtaining approval of the final plan
- obtaining risk management strategies
- preparing to plan project
- reviewing project plan against inputs and rectifying any anomalies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- control system industry sector customs and practices
- critical path and project analysis
- instrumentation and control project planning
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant plant, material, labour and related costs
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
  - design brief specification

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- project plan proposal
- relevant workplace quality, instructions, policies and procedures
- risk management strategies.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to planning instrumentation and control projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0001 Analyse the operation of HVAC air and hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse the operating parameters of heating, ventilation and air conditioning (HVAC) air and hydronic systems.

It includes working safely, applying knowledge of operating parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting results and solutions for use in design work.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

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UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse the operation of HVAC air and hydronic systems	**1.1** WHS/OHS processes and procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Operating analysis is determined from performance specifications, situation reports and consultations with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in accordance with workplace procedures and consultations with others involved in the work

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	1.5	Strategies are formed for solution development and implementation is carried out in accordance with workplace procedures
2 Analyse the operation of systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Principles of HVAC air and hydronic systems operating parameters are applied to analytical solutions to refrigeration and air conditioning systems
	2.3	Parameters, specifications and performance requirements in relation to HVAC air and hydronic systems are obtained in accordance with workplace procedures
	2.4	Analysis of operating parameters is carried out to provide solution in accordance with workplace procedures
	2.5	Unplanned events are dealt with safely in accordance with relevant industry standards and workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Report on results of operation systems analysis and actions taken	**3.1**	Results of system operating analysis are evaluated to determine performance requirements in accordance with workplace procedures and performance specifications
	3.2	Analysis, findings, calculations and assumptions are documented in accordance with workplace procedures
	3.3	Analysis is reported to relevant person/s to determine relevant action in accordance with workplace procedures
	3.4	Justification for findings and actions to be undertaken in relation to equipment is documented in relevant work/project and/or development records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Analysing operating parameters must include at least the following:

- two different HVAC systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ164A Analyse the operation of HVAC air and hydronic systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0001 Analyse the operation of HVAC air and hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the operating performance
- forming effective strategies for analysing air conditioning systems performance
- obtaining operating parameters, specifications and performance requirements appropriate to each situation
- evaluating the results of the analysis
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- dealing with unplanned events
- analysing the operation of heating, ventilation and air conditioning (HVAC) air and hydronic systems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- preparing to analyse the operation of HVAC air and hydronic systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC air systems, safe working practices and relevant standards, codes and regulations, including:
  - air distribution principles:
    - air diffuser selection
    - factors affecting the design of ductwork systems
    - types of ductwork systems
    - static, velocity and total pressure
    - laminar and turbulent flow

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    - moody diagram
    - parameters that control cost
  - pressure loss:
    - friction and dynamic
    - colebook - White formula
    - in ducts and friction charts
    - in fittings and loss co-efficient
    - fitting selection criteria
    - diffuser pressure loss
  - system sizing:
    - velocity method
    - equal friction method
    - static regain method
    - balanced pressure drop method
    - circular to rectangular equivalent
    - standard duct sizes and gauges
    - balancing
  - heat and leakage losses:
    - heat gain/loss calculation
    - bare vs. insulated
    - leakage
  - overview of noise in duct systems:
    - noise sources in duct systems
    - attenuation
    - impact on design
    - methods of control
  - fans:
    - types and characteristics
    - fan laws
    - system effect
    - fan selection
    - fan and system curves
  - air systems:
    - dual and single duct constant volume
    - variable volume
    - induction units
    - multi-zone
    - diversity factors
  - HVAC systems
- HVAC hydronic systems, safe working practices and relevant standards, codes and

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regulations, including:

- systems operation
  - closed/open systems
  - pump head/lift and static head (high-rise building)
  - system friction losses
  - nett positive suction head
  - system curves
- pumps:
  - types
  - selection criteria
  - performance characteristics
  - bladder tanks
  - coil characteristics
  - heat exchangers: plate, shell and tube, and tube in tube
  - flow measurements: types
  - flow switchers
  - builders: types and performance characteristics
  - cooling towers: elementary cooling thermodynamics and types
- valves - flow control devices:
  - types and applications
  - throttling characteristics
  - flow measurements
  - selection and applications
- piping systems:
  - balancing and commissioning
  - air venting
  - water treatment
  - vacuum breaking and air breaks
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0002 Analyse the psychrometric performance of HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse the psychrometric performance of heating, ventilation and air conditioning/refrigeration (HVAC/R) systems.

It includes analysing HVAC/R system to provide solutions to psychrometric performance issues. It also includes working safely, gathering and analysing psychrometric performance data, applying problem-solving techniques, and developing and documenting results and solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

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UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse psychrometric performance of HVAC/R system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for HVAC/R work
	1.3 Extent of the psychrometric issues are determined from performance specifications and situation reports and in consultation with relevant person/s
	1.4 HVAC/R activities are planned to meet scheduled timelines in consultation with other person/s involved in the work
	1.5 Strategies are formed to ensure HVAC/R analysis and solution implementation is carried out efficiently in accordance with workplace procedures

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2	**Analyse psychrometric performance of HVAC/R system**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out HVAC/R work are followed
		2.2 Psychrometric principles are applied to analytical solutions to HVAC/R system
		2.3 Parameters, specifications and performance requirements in relation to HVAC/R system are obtained in accordance with workplace procedures
		2.4 Analysis of HVAC/R psychrometric parameters is carried out to provide effective solutions
		2.5 Unplanned situations are responded to in accordance with regulatory requirements and workplace procedures in a manner that minimises risk to personnel and equipment
		2.6 Quality of work is monitored against performance agreement and/or workplace procedures and industry standards
3	**Document and report results of the HVAC/R psychrometric performance analysis and actions taken**	**3.1** Solution/s to HVAC/R psychrometric issues are evaluated to determine their effectiveness and modified, as required
		3.2 HVAC/R analysis is documented and includes details of findings, calculations and assumptions
		3.3 HVAC/R analysis is reported to appropriate person/s to determine appropriate action to be taken based on findings
		3.4 Justification for findings and any actions to be undertaken in relation to the HVAC/R equipment is documented for inclusion in work/project or development records in accordance with industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

analysing psychrometric parameters of HVAC/R systems must include at least the following:	• two different refrigeration and air conditioning systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ192A Analyse the psychrometric performance of HVAC/R systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0002 Analyse the psychrometric performance of HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the psychrometric performance issues
- forming effective strategies for analysing refrigeration and air conditioning systems performance
- obtaining psychrometric performance parameters, specifications and performance requirements appropriate to each situation
- evaluating the results of the analysis
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- dealing with unplanned events
- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- heating, ventilation and air conditioning/refrigeration (HVAC/R) psychometrics, safe working practices and relevant standards, codes and regulations, including:
  - fundamentals and terms:
    - sensible heat factor (conditioned space and grand total)
    - quantity of air
    - effective surface temperature
    - bypass factor
  - coil characteristics:

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    - processes
    - sensible cooling
    - cooling and dehumidification
    - sensible heating
- spray processes:
    - saturation efficiency
    - processes
    - adiabatic/evaporative cooling
    - cooling and humidification
    - sensible cooling
    - chemical dehumidification process: dehumidification and heating
    - cooling tower characteristics: humidification and cooling
    - indirect evaporative cooling process
- system analysis:
    - partial load
    - reheat control
    - bypass control
    - volume control
    - dump back systems
    - low velocity coils
- psychrometric formulae and charts:
    - properties of air
    - gas constants
    - derivation of air constants
    - combined gas laws
    - Dalton’s law of partial pressures
    - carrier’s equation
    - psychrometric property tables
    - air mixing equations
    - air quantity equations
- problem-solving techniques
- psychrometric physical and thermodynamic properties of gas-vapor mixtures, including psychrometric principles
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- typical psychrometric performance issues.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse the thermodynamic performance of heating, ventilation and air conditioning/refrigeration (HVAC/R) systems.

It includes analysing HVAC/R systems and providing solutions to thermodynamic performance issues. It also includes working safely, gathering and analysing thermodynamic performance data, applying problem-solving techniques, and developing and documenting results and solution/s.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to analyse thermodynamic performance of HVAC/R system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified and applied

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	1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for HVAC/R work
	1.3	Extent of the thermodynamic issues are determined from performance specifications and situation reports and in consultation with relevant person/s
	1.4	HVAC/R activities are planned to meet scheduled timelines in consultation with others involved in the work
	1.5	Strategies are formed to ensure HVAC/R analysis and solution implementation is carried out efficiently in accordance with workplace procedures
2 Analyse thermodynamic performance of HVAC/R system	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out HVAC/R work are followed
	2.2	Thermodynamic principles are applied to analytical solutions to HVAC/R system
	2.3	Parameters, specifications and performance requirements in relation to HVAC/R system are obtained in accordance with workplace procedures
	2.4	Analysis of HVAC/R thermodynamic parameters is carried out to provide effective solution/s
	2.5	Unplanned events are dealt with safely and effectively in accordance with regulatory requirements and workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Quality of work is monitored against performance agreement and/or workplace procedures or industry standards
3 Document and report results of the HVAC/R thermodynamic performance analysis and actions taken	**3.1**	Solutions to HVAC/R thermodynamic issues are evaluated to determine their effectiveness and modified, as required
	3.2	HVAC/R analysis is documented and includes details of findings, calculations and assumptions
	3.3	HVAC/R analysis is reported to appropriate person/s to

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determine appropriate action to be taken based on findings

3.4 Justification for findings and any actions to be undertaken in relation to the HVAC/R equipment is documented for inclusion in work/project or development records in accordance with industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Analysing thermodynamic parameters of HVAC/R systems must include at least the following:

- two different refrigeration and air conditioning systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ193A Analyse the thermodynamic performance of HVAC/R systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the thermodynamic performance issues
- forming effective strategies for analysing refrigeration and air conditioning systems performance
- obtaining thermodynamic performance parameters, specifications and performance requirements appropriate to each situation
- evaluating the results of the analysis
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- dealing with unplanned events
- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigeration systems, safe working practices and relevant standards, codes and regulations, including:
  - major components, type and functions:
    - evaporators
    - compressors
    - expansion devices
    - ancillary components
    - refrigerants

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- system operation and performance:
  - thermodynamic properties of refrigerants
  - pressure enthalpy charts
  - refrigerant cycle
  - refrigerant cycle represented on pH charts
  - introduction to refrigerating effect, heat of compression, heat rejected on high side, co-efficient of performance, liquid sub-cooling suction superheating
  - effects on performance of changing operating pressures, liquid sub-cooling, suction superheating
- application of refrigeration:
  - introduction to industrial refrigeration, specific system component types and refrigerants
  - scope of commercial refrigeration, specific system component types and refrigerants
- refrigerated enclosures and cabinets:
  - merchandising and display cabinets:
  - deep freeze meat
  - dairy
  - fruit and vegetable
  - multi-deck display
  - single deck
  - well type
  - island cases
  - glass door
  - reach door
  - reach in merchandisers
  - defrosting methods
  - cold rooms and freezer rooms
  - types and construction
  - insulation
  - vapour barrier
  - frost heave
  - interior fittings
  - location of equipment
  - defrosting methods
  - cold tracking
  - trace heating
  - storage conditions
  - temperature
  - relative humidity
  - air velocity

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    - air patterns
    - load limits
  - air conditioning systems
- introduction to air conditioning systems, safe working practices and relevant standards, codes and regulations, including:
  - WHS/OHS requirements:
    - Building Code of Australia (BCA) requirements
    - AS 1668 The use of ventilation and air conditioning in buildings parts 1 and 2
    - AS/NZS 3666 Air-handling and water systems of buildings
    - noise and vibration
    - air quality
    - sick building syndrome
  - operating requirements:
    - ventilation
    - air distribution
    - terminal velocity
    - temperature
    - relative humidity
    - air quality
    - noise
    - basic psychrometrics
  - operating modes:
    - ventilation
    - evaporative cooling
    - ventilation and cooling
    - ventilation and heating
    - dehumidification
    - dehumidification and reheat
    - humidification
  - operating terminology/characteristics:
    - throw and drop
    - primary and secondary air
    - coanda effect
  - heating, ventilation and air conditioning (HVAC) system components and functions:
    - fans
    - ducting
    - registers
    - dampers
    - filters
    - cooling coils

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    - heating coils
    - induction units
    - fan coil units
    - terminal units
    - humidifiers, pumps and sprayers
    - hydronic systems and components
- applications and construction of air conditioning systems:
    - applications
    - residential, commercial, low and high rise, industrial ventilation and air conditioning
    - packaged plant
    - split systems (wall and floor console, ceiling fan coil), wall facia, roof top and reverse cycle option central station plant
    - all air systems, constant volume variable temperature, constant temperature variable volume, and air/water systems
    - all water system, multi-zoning, thermal storage systems
    - basic air conditioning system diagrams
    - duct layout
    - hydronic layout
    - unit/conditioner drawings
- HVAC control systems:
    - basic principles
    - terminology
    - symbols and diagrams
    - basic applications
- problem-solving techniques
- relevant HVAC/R manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures
- typical thermodynamic performance issues.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational

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situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to analyse vibration and noise in refrigeration and air conditioning systems.

It includes analysing refrigeration and air conditioning system to provide solutions to noise, sound and vibration issues. It also includes working safely, gathering and analysing data, applying problem-solving techniques, and developing and documenting results and solutions for use in design work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

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UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare refrigeration and air conditioning system to analyse noise and vibration in	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Extent of the noise and vibration issue is determined from performance specifications, situation reports and consultations with relevant person/s
	1.4 Work activities are planned to meet scheduled timelines in consultation with others involved in the work

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	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Analyse refrigeration and air conditioning system noise and vibration	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Noise, vibration and thermodynamic analytical solutions are applied to refrigeration and air conditioning system
	2.3	Parameters, specifications and performance requirements in relation to refrigeration and air conditioning system are obtained in accordance with workplace procedures
	2.4	Approaches to analysing noise and vibration parameters are carried out to provide the most effective solution
	2.5	Unplanned events are dealt with safely in accordance with workplace procedures and regulatory requirements in a manner that minimises risk to personnel and equipment
	2.6	Refrigeration and air conditioning system work quality is monitored against performance agreement and/or workplace or industry standards
3 Document actions taken and report on noise and vibration analysis	**3.1**	Solutions to noise and vibration issues are evaluated to determine their effectiveness and modified, as required, in accordance with workplace procedures
	3.2	Refrigeration and air conditioning system analysis is documented and includes details of findings calculations and assumptions
	3.3	Refrigeration and air conditioning system analysis is reported to appropriate person/s to determine appropriate action to be taken based on findings
	3.4	Justification for findings and any actions to be undertaken in relation to the equipment is documented for inclusion in work/project or development records in accordance with industry standards and workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Analysing noise, sounds and vibration must include at least the following:	• two different refrigeration and air conditioning systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ138A Analyse vibration and noise in refrigeration and air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the noise and vibration issues
- forming effective strategies for analysing refrigeration and air conditioning systems performance
- obtaining noise and vibration parameters, specifications and performance requirements appropriate to each situation
- evaluating the results of the analysis
- documenting analysis details of all findings, calculations and assumptions
- documenting justification of actions to be implemented in accordance with professional standards
- dealing with unplanned events
- applying problem-solving procedures, including using appropriate theorems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- noise and vibration in refrigeration and air conditioning systems, safe working practices and relevant standards, codes and regulations, including:
  - fundamentals of sound:
    - frequency
    - decibels
    - octave bands
    - direct sound
    - velocity

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    - sound pressure level
    - sound power level
    - sound meters
- noise and people:
    - physical measurement of sound
    - weighting networks
    - NR curves
    - noise damage to hearing
    - evaluate daily noise exposures
    - peak noise levels
    - attenuation for hearing protectors
    - excess noise levels permissible
    - noise abatement Acts
    - advanced noise and vibration control
- sound in confined and unconfined spaces:
    - inverse square laws
    - direct and reflective sound
    - reverberation time
    - Sabine's formula
    - absorption coefficients of surfaces
    - types of absorbers and their operation
    - insulation performances of partitions
- identification and analysis of problems:
    - one-dimensional sound waves
    - standing waves
    - energy in a sound wave
    - sources
    - effects of air turbulence
    - transmitters
    - amplifiers
    - absorptivity
    - reflectivity
    - room characteristics
    - acoustic design in buildings
    - fan and air noise transmission in ducts
- methods of control:
    - natural attenuation
    - sound absorbing materials and placement
    - duct lining

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    - lined plenums
    - lined duct splitters
    - duct attenuators
    - white noise
    - vibration isolators
  - acoustic specifications:
    - attenuator ratings
  - sound insulation:
    - plant room breakout
    - controlling plant room noise
  - duct borne noise:
    - sound power spectra for fans
    - noise attenuation in ducts and fittings
    - reducing fan noise transmission
    - regeneration noise
    - sources of regenerated noise
    - use tables to estimate regenerative noises
    - breakout situations
    - fan noise breakout
    - list methods of controlling breakout
  - controlling the cost:
    - economical use of attenuation
  - vibration:
    - simple harmonic motion (SHM)
    - period
    - frequency
    - amplitude
    - estimate frequencies for fans, pumps and refrigeration plant
    - estimate transmission of vibration
    - vibration control for building structures
    - use transmissibility graphs to select springs, vibration eliminators and pads
    - types of isolation materials and mounting devices
    - select isolation and mounting devices
    - inertia blocks
- noise and vibration analysis computer software packages
- relevant job safety assessments or risk mitigation processes
- relevant technique, process or measurement methods to obtain sound, noise and vibration data, including problem-solving procedures and appropriate theorems
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply safety awareness and regulatory and industry standard requirements for ammonia refrigerant.

It includes safety and legal requirements when handling, using and storing ammonia refrigerant.

The skills and knowledge in this unit will be applied by those managing, supervising or working in or near a location that contains refrigeration equipment using ammonia refrigerant. These could include managers, supervisors, maintenance staff, cleaners, employees and refrigeration and air conditioning technicians.

Dangerous goods and work health and safety (WHS)/occupational health and safety (OHS) legislative requirements apply to this unit.

Pre-requisite Unit

Not applicable.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work with	**1.1** WHS/OHS requirements and workplace procedures for

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a**mmonia refrigerant**		a given work area are identified and applied
	1.2	Work area access permits are obtained from appropriate person/s in accordance with workplace procedures and legislative requirements
	1.3	Electrical and non-electrical isolation are identified and carried out to prevent creation of hazards from loss of machine/system/process control in accordance with workplace procedures
	1.4	Tools and equipment needed for the work are checked for safety and correct functionality in accordance with workplace procedures and regulatory requirements
2 Apply safe work practices to a**mmonia refrigerant**	**2.1**	Ammonia refrigerant workplace procedures, legislative requirements and work instructions for controlling risk are followed
	2.2	Accidents, events, fires and emergencies are responded to in accordance with workplace procedures and legislative requirements within scope of own responsibility in a manner that minimises risk to personnel and equipment
3 Follow workplace procedures for hazard identification and risk control of a**mmonia refrigerant**	**3.1**	Ammonia refrigerant hazards are identified, risk assessed and control measures implemented and monitored through active participation in the consultation process with work supervisor and other person/s
	3.2	WHS/OHS incident records are completed in accordance with regulatory requirements and workplace procedures
	3.3	Ammonia refrigerant workplace instructions and training are followed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Applying safety awareness and legal requirements for ammonia refrigerant must include the following:	• safe handling, storage and transport of ammonia refrigerant cylinders • labelling requirement for ammonia refrigerant cylinders and systems containing ammonia refrigerant • personal protective equipment (PPE) required for the safe handling of ammonia refrigerant

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ178A Apply safety awareness and legal requirements for ammonia refrigerant.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, workplace procedures and practices, including:
  - using risk control measures
  - following workplace procedures for hazard identification and risk control of ammonia refrigerant
- applying safe working practices to safely handle and store ammonia refrigerant cylinders
- applying working procedures and instructions as they apply to risk control measures
- completing required documentation dealing with accidents and emergencies within the scope of responsibility
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying ammonia (R717) refrigerant safety data sheets (SDS)/material safety data sheets (MSDS) and workplace emergency response procedures
- participating in consultation processes, identifying hazards and implementing and monitoring control measures
- preparing to enter workplace, including using work permits, clearances and isolation permissions
- taking remedial action within workplace emergency response procedures and job role.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ammonia (R717) refrigerant SDS/MSDS
- emergency procedures and incident management requirements and procedures
- hazardous goods, segregation, storage and handling of ammonia refrigerant
- refrigerant disposal requirements

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- relevant acts, regulations, codes of practice and industry standard requirements
- relevant ammonia cylinder safe handling and storage requirements
- relevant job safety assessments or risk mitigation processes, including safety management and risk management
- relevant WHS/OHS legislated, regulations and codes of practice related to hazards using ammonia refrigerant in refrigeration and air conditioning systems
- relevant workplace documentation
- relevant workplace policies and procedures, including specific safety procedures and work instructions related to working with refrigeration and air conditioning systems containing ammonia refrigerant
- safe work practices with ammonia refrigerant, including:
  - flammability of ammonia
  - physical effects of ammonia
  - properties of ammonia.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, emergency response plan, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply safety awareness and legal requirements for carbon dioxide (CO^2) refrigerant.

It includes applying safety and legal requirements when handling, using and storing CO^2 refrigerants.

The skills and knowledge in this unit will be applied by those managing, supervising or working in or near a location that contains refrigeration equipment using CO^2 refrigerant. These could include managers, supervisors, maintenance staff, cleaners, employees and refrigeration and air conditioning technicians

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work with CO^2	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) hazards, risk control methods, relevant

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refrigerant		standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2	Electrical and non-electrical isolation are identified and carried out to prevent creation of hazards from loss of machine/system/process control in accordance with workplace procedures
	1.3	Tools and equipment needed for the work are checked for safety and correct functionality in accordance with workplace procedures and regulatory requirements
2 Apply safe work practices in using CO^2refrigerant	**2.1**	CO^2 refrigerant workplace procedures and work instructions for controlling risk are followed
	2.2	Accidents, fires and emergencies are responded to in accordance with workplace procedures and within scope of own responsibility in a manner that minimises risk to personnel and equipment
3 Follow workplace procedures for hazard identification and risk control of CO^2refrigerant	**3.1**	CO^2 refrigerant hazards are identified, risk assessed and control measures implemented and monitored through active participation in the consultation process with work supervisor and others
	3.2	WHS/OHS incident records are completed in accordance with regulatory requirements and workplace procedures
	3.3	CO^2 refrigerant workplace instructions and training are followed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Applying safety awareness and legal requirements for CO^2 refrigerant must include the following:

- safe handling, storage and transport of CO^2 refrigerant cylinders
- labelling requirement for CO^2 refrigerant

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cylinders and systems containing CO^2 refrigerant
- personal protective equipment (PPE) required for the safe handling of CO^2 refrigerant

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ184A Apply safety awareness and legal requirements for carbon dioxide refrigerant.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying safe working practices to carbon dioxide (CO^2) refrigerant safety data sheets (SDS)/material safety data sheets (MSDS)
- applying safe working practices to safely handle and store CO^2 refrigerant cylinders
- completing required documentation
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- participating in consultation processes, identifying hazards and implementing and monitoring control measures
- preparing to enter the workplace, including the use of work permits and clearances and isolation permissions
- taking remedial action within workplace emergency response procedures and job role.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- benefits of using CO^2 as a refrigerant (R744)
- CO^2 cylinder handling and storage requirements
- CO^2 refrigerant properties
- chlorofluorocarbon (CFC)/hydrofluorocarbon (HFC) phase out
- emergency procedures and incident management requirements and procedures
- refrigerant 2T Hazchem codes
- relevant CO^2 refrigeration system manufacturer specifications
- relevant industry standards, codes and practice requirements

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- relevant job safety assessments or risk mitigation processes, including personal protective equipment (PPE)
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- safe working practices with CO^2 refrigerant
- SDS/MSDS.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply safety awareness and legislative requirements for Class A2, A2L and A3 flammable refrigerants.

It includes applying safety and relevant legislation to safely handle and store flammable refrigerants.

Dangerous goods and ozone protection, work health and safety (WHS)/occupational health and safety (OHS), and synthetic greenhouse gas management legislative requirements apply to this unit.

The skills and knowledge in this unit will be applied by those managing, supervising or working in or near a location that contains refrigeration or air conditioning equipment using flammable refrigerant. These could include managers, supervisors, maintenance staff, cleaners, employees and refrigeration and air conditioning technicians

Pre-requisite Unit

Not applicable

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to work with flammable refrigerants**	**1.1** WHS/OHS requirements, legislative requirements and workplace procedures for a given work area are identified, obtained and applied
		1.2 Work area access permits are obtained from relevant person/s in accordance with workplace procedures
		1.3 Preparations for electrical and non-electrical isolation to prevent hazards from loss of machine/system/process control are conducted in accordance with WHS/OHS and workplace procedures
		1.4 Tools and equipment required for work are checked for safety and correct functionality in accordance with workplace procedures and relevant industry standards
2	**Apply safe working practices to flammable refrigerants**	**2.1** WHS/OHS risk control measures, legislative requirements and workplace procedures for carrying out the work are followed
		2.2 Workplace procedures for dealing with accidents, fires and emergencies are followed in accordance with WHS/OHS, legislative requirements and workplace procedures
3	**Follow workplace procedures for hazard identification and risk control of flammable refrigerants**	**3.1** Hazards are identified and risk control measures implemented and monitored in consultation with relevant person/s
		3.2 Hazards in the work area are recognised and reported to relevant person/s in accordance with workplace procedures
		3.3 WHS/OHS records of incidents are completed in accordance with relevant industry standards and workplace procedures
		3.4 Workplace instructions and training are followed in accordance workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Applying safety awareness and legal requirements for flammable refrigerants must include the following:	• class A2, A2L and A3 refrigerants • safe handling, storage and transport of flammable refrigerant cylinders • labelling requirement for flammable refrigerant cylinders and systems containing flammable refrigerant • personal protective equipment (PPE) required for the safe handling of flammable refrigerant

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ174A Apply safety awareness and legal requirements for flammable refrigerants.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying safe working practices to safely handle and store flammable refrigerant cylinders
- applying work procedures and instructions as they apply to risk control measures
- dealing with accidents and emergencies within the scope of responsibility
- dealing with unplanned events
- following workplace procedures for hazard identification and risk control of flammable refrigerants
- participating in consultation processes, identifying hazards and implementing and monitoring control measures
- preparing to enter the workplace, including using work permits and clearances and isolation permissions
- preparing to work with flammable refrigerants.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- emergency procedures and incident management requirements and procedures
- first aid
- problem-solving techniques
- refrigerant disposal requirements
- relevant acts, regulations, code of practice and industry standard requirements
- relevant cylinders and storage requirements
- relevant environmental issues
- relevant flammable refrigerant types and applications
- relevant manufacturer specifications

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- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- types of Class A2, A2L and A3 flammable refrigerants.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0008 Audit HVAC/R control systems for compliance with regulations and standards

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to audit heating, ventilation and air conditioning/refrigeration (HVAC/R) control systems for compliance with regulations and standards.

It includes working safely, setting up and conducting evaluation measurements, evaluating performance from measured parameters, and documenting results and recommending any resulting corrective actions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0021 Design control systems for refrigeration or heating, ventilation and air conditioning systems

UEERA0060 Produce HVAC/R control system diagrams

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

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UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to audit HVAC/R control systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Examination and testing areas are checked for safety hazards and risk control measures implemented in accordance with WHS/OHS requirements and workplace procedures
	1.4 Relevant documentation is obtained and interpreted to determine the performance/certification requirements of the system to be assessed in accordance with workplace procedures and relevant industry standards
	1.5 Advice is sought from the work supervisor to ensure the

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			work is coordinated effectively with others
		1.6	Tools, testing devices and materials required to carry out work are obtained and checked for correct operation and safety
2	**Audit HVAC/R control systems**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2	Need to test and measure live work is determined in accordance with WHS/OHS requirements and workplace procedures
		2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
		2.4	Performance and energy efficiency requirements of HVAC/R system and assessment methods are applied to the audit process in accordance with workplace procedures
		2.5	Control system examination and tests for particular parameter/s are conducted in accordance with relevant test methods and workplace procedures
		2.6	Control system examination and tests are carried out methodically and results noted in accordance with workplace procedures
		2.7	Unplanned situations are dealt with safely and with the approval of relevant person/s
		2.8	Audit is carried out without damage to systems, circuits, the surrounding environment or services using sustainable energy practices
3	**Complete auditing work and document results**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures
		3.3	Examination and test results are evaluated and non-compliance issues identified in accordance with workplace procedures
		3.4	Examination test results and comments on non-compliance issues are documented and reported to relevant person/s in accordance with workplace

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procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

auditing HVAC/R control systems must include at least the following:	• two different HVAC/R control systems • four different control scenarios

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ148A Audit HVAC/R control systems for compliance with regulations and standards.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0008 Audit HVAC/R control systems for compliance with regulations and standards

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- interpreting compliance documents
- setting up and conducting appropriate examinations and tests
- identifying non-compliance defects
- reporting examination and test results and non-compliance issues clearly and accurately
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- auditing heating, ventilation and air conditioning/refrigeration (HVAC/R) control systems for compliance with regulations and standards
- completing auditing work and documenting results
- dealing with unplanned situations
- preparing to audit HVAC/R control systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC/R control system audits, safe working practices and relevant standards, codes and regulations, including:
  - review of HVAC/R system components
  - performance requirements of control applications from available system specifications and design briefs
  - descriptions of operation
  - measurements and recordings of system performance, as required to confirm plant control compliance with desired conditions
  - comparison of system specifications, control strategies, design briefs and recorded test results with current HVAC/R energy management principles to establish the economy of operation of HVAC/R plant

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    - preparation a detailed report outlining the results of investigation and stating suggested control system adjustments, alterations and modifications to improve the performance of the plant
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant systems for compliance with regulations and relevant industry standards
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0009 Audit energy use for commercial HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to audit energy use for commercial heating, ventilation and air conditioning/refrigeration (HVAC/R) systems.

It includes assessing the energy used by commercial HVAC/R systems in relation to its performance for improving efficiency and/or certification as meeting energy efficiency industry standards. It also includes safe working practices, determining efficiency requirements, setting up performance and energy tests, evaluating results and documenting test outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0039 Evaluate and report on building services energy management systems

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

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UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to audit energy use for a commercial HVAC/R application	**1.1** WHS/OHS processes and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 HVAC/R system assessment and testing area are checked for safety hazards and risk control measures implemented in accordance with safety policy and workplace procedures

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	1.4	Relevant documentation is obtained and read to determine performance/certification assessment requirements
	1.5	Advice is sought from the work supervisor to ensure work is coordinated effectively with others
	1.6	Tools, testing devices and materials needed to carry out the work are obtained and checked for correct operation and safety
2 Audit energy use for a commercial HVAC/R application	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Circuits/apparatus/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	HVAC/R system performance and energy efficiency requirements and assessment methods are applied to the audit process
	2.4	HVAC/R apparatus assessment and tests are set up in accordance with established test methods and workplace procedures for each parameter being audited
	2.5	HVAC/R system assessment and tests are carried out methodically and results and required actions systematically noted
	2.6	Unexpected situations are dealt with safely in accordance with workplace procedures with the approval of an authorised person/s in a manner that minimises risk to personnel and equipment
	2.7	Auditing is carried out without damage to systems, circuits, the surrounding environment or services using sustainable energy practices
3 Document auditing activities and results	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Assessment and test results are evaluated, non-compliance issues identified, and appropriate actions determined and documented

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3.4 Assessment test results and recommendations on non-compliance issues are documented and reported to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Auditing energy use must include at least the following:

- two different commercial HVAC/R systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ147A Audit energy use for commercial HVAC/Refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0009 Audit energy use for commercial HVAC/R systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- interpreting performance/certification requirements correctly
- setting up and conducting appropriate system assessments and tests
- identifying non-compliance issues
- reporting assessment and test results and non-compliance issues and recommendations appropriately
- dealing with unplanned events
- analysing results from test data, including:
  - analysing electricity tariffs and implications
  - analysing total consumption versus peak load
  - comparing against industry standards
  - reviewing current practices against ideal
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- auditing energy use for commercial heating, ventilation and air conditioning/refrigeration (HVAC/R) system, including:
  - documenting auditing activities results and appropriate actions
- planning audit energy use for a commercial HVAC/R application.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC/R energy audits, safe working practices and relevant standards, codes and regulations, including:
  - identification of major energy consuming plant:

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    - review of HVAC/R system components
- methods of energy conservation:
    - review of energy conserving strategies
    - house keeping
    - time schedules
    - good maintenance practices:
        - filters, fans, appropriate set points and dead bands
    - HVAC/R system control:
        - night cycle
        - optimum stop/start
        - purge cycles
        - chiller/boiler/cooling tower sequencing
        - economy cycles (based on temperature or enthalpy)
        - supply air reset
        - condenser water temperature reset
    - electrical load control:
        - power demand control
        - load limiting
        - load shedding
        - set point relaxation
        - ventilation cycles
- tests and data collection procedures:
    - use of building management system for data collection (trending)
    - use of data recorders (loggers)
    - monitoring of building operations generally
- analysis of results from test data:
    - comparison against standards (BOMA)
    - revision of current practices against ideal
    - total consumption vs. peak load
    - electricity tariffs and implications
- methods of reducing energy usage:
    - plant retrofits
    - controls - application of strategies
    - plant - fixed OA to economy, boiler to electric reheat, constant volume to variable air volume (VAV) and cost-benefit (payback)
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0010 Commission complex heating, ventilation and air conditioning (HVAC) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up, adjust and commission complex heating, ventilation and air conditioning (HVAC) and refrigeration systems for optimum performance.

It includes working safely, testing and analysing system parameters, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission	**1.1** WHS/OHS procedures are obtained and implemented in

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complex HVAC systems		accordance with workplace procedures
	1.2	WHS/OHS risk control measures and procedures for work are followed
	1.3	Safety hazards not previously identified are risk assessed and documented and risk control measures implemented
	1.4	Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5	System operating parameters are identified by reviewing system specifications and component technical data
	1.6	Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
	1.7	Preparatory work is checked to ensure damage has not occurred and is compliant with requirements
	1.8	Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	1.9	Circuits are checked as being isolated in accordance with WHS/OHS requirements and workplace procedures
2 Commission complex HVAC systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate person/s, job specifications and requirements
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Commissioning is carried out efficiently without waste

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		of materials or damage to apparatus, the surrounding environment or services applying sustainable energy principles
3	**Complete and report commissioning activities**	**3.1** WHS/OHS risk control work completion measures and procedures are followed
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Adjustment settings and results of commissioning work are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning complex HVAC systems must include at least at least the following:	• two different types of complex HVAC systems incorporating multiple major components (i.e. compressors, condenser or evaporators), circuits or systems and associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ123A Commission complex (HVAC) heating, ventilation and air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0010 Commission complex heating, ventilation and air conditioning (HVAC) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying system design operating parameters
- measuring and adjusting system components and controls to provide optimum system performance
- ensuring system operates within regulatory requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - applying sustainable energy principles and practices
  - hazard identification and reporting
  - implementing risk control measures
- commissioning complex heating, ventilation and air conditioning (HVAC) systems
- completing and reporting on commissioning activities
- determining need to test or measure live work
- isolating circuits
- preparing to commission complex HVAC systems
- using relevant tools, equipment, testing and measuring devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex HVAC system commissioning, safe working practices and relevant standards, codes and regulations, including:
  - commissioning fundamentals:

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    - building specifications/requirements/responsibilities
    - design and as installed drawings
    - building codes
    - local government regulations
    - design conditions
    - pre-commissioning checks
    - calibration of instruments
    - commissioning procedures
    - data collection, recording and documentation
    - reporting procedures
- air systems:
    - factors affecting the design of ductwork systems
    - types of ductwork systems
    - static, velocity and total pressure
    - air testing and balancing
    - air flow
    - pressure
    - temperature
- fans:
    - types and characteristics
    - fan laws
    - fan and system curves
    - fan testing
- air balancing:
    - equipment, instruments and procedures
    - leakage testing
- overview of noise in duct systems:
    - noise sources in duct systems
    - attenuation
    - methods of control
- system capacity calculations
- hydronic systems:
    - hydronic instruments
    - fluid flow
    - pumps: pump curves and system curves
    - pump testing
    - capacity calculations
- plant and equipment:
    - controls

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    - heat exchangers
    - chillers
    - boilers
    - cooling towers
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
    - environmental and sustainable energy principles and practices
- relevant workplace documentation
- relevant workplace policies and procedures
- system operating parameters.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0011 Commission complex refrigeration systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up, adjust and commission complex refrigeration systems for optimum performance.

It includes working safely, testing and analysing system parameters, adjusting equipment and controls, following workplace procedures and documenting final operating parameters and settings.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

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UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission complex refrigeration	**1.1** WHS/OHS procedures are obtained and implemented in accordance with workplace procedures

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	systems	
		1.2 WHS/OHS risk control measures and procedures for work are followed
		1.3 Safety hazards not previously risk assessed are documented and risk control measures implemented
		1.4 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
		1.5 System operating parameters are identified by reviewing system specifications and component technical data
		1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
		1.7 Preparatory work is checked to ensure damage has not occurred and is compliant with requirements
		1.8 Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
		1.9 Circuits are checked as being isolated in accordance with WHS/OHS requirements and workplace procedures
2	**Commission complex refrigeration systems**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2 Testing/measuring devices are connected and set up in accordance with requirements for a particular system
		2.3 Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements
		2.4 Decisions for dealing with unexpected situations are made from discussions with appropriate person/s, job specifications and requirements
		2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
		2.6 Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding

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		environment or services applying sustainable energy principles
3	**Complete and report commissioning activities**	**3.1** WHS/OHS risk control work completion measures and procedures are followed
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Adjustment settings and results of commissioning work are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning complex refrigeration systems and equipment must include at least the following:	• two different types of complex refrigeration systems incorporating multiple major components, including: • compressors • condensers • evaporators • circuits • systems and associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ125A Commission complex refrigeration systems and equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0011 Commission complex refrigeration systems and equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying system operating parameters
- measuring and adjusting system components and controls to provide optimum system performance
- ensuring system operates within regulatory requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - applying sustainable energy principles and practices
  - hazard identification and reporting
  - implementing risk control measures
- commissioning complex refrigeration systems
- completing and reporting on commissioning activities
- determining need to test or measure live work
- isolating circuits
- preparing to commission complex refrigeration systems
- using relevant tools, equipment testing and measuring devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex refrigeration systems commissioning, safe working practices and relevant standards, codes and regulations, including:
  - commissioning fundamentals:

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    - building specifications/requirements/responsibilities
    - design and ‘as-installed’ drawings
    - building codes
    - local government regulations
    - design conditions
    - pre-commissioning checks
    - calibration of instruments
    - commissioning procedures
    - data collection and recording, and documentation
    - reporting procedures
  - air systems (excluding air balancing):
    - instruments
    - airflow
    - pressure
    - temperature
    - fan testing
    - leakage testing
    - system capacity calculations
  - hydronic systems:
    - hydronic instruments
    - fluid flow
    - pumps: pump curves and system curves
    - pump testing
    - capacity calculations
  - refrigeration systems:
    - AS/NZS 1677 Refrigerating systems SAA refrigeration code
    - codes of practice
    - pressure testing
    - evacuation
    - charging
    - control setting
    - commissioning reports
    - system performance and capacity
  - plant and equipment:
    - controls
    - heat exchangers
    - chillers
    - boilers
    - cooling towers
- safe working practices and relevant standards, codes and regulations

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- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
  - environmental and sustainable energy principles and practices
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0012 Commission complex refrigeration/air conditioning control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to set up, adjust and commission complex control systems for refrigeration or air conditioning optimum performance.

It includes applying safe working practices, testing and analysing system parameters, adjusting equipment and controls, following procedures and documenting final operating parameters and settings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

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UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

UEERA0033 Diagnose faults in complex HVAC/refrigeration control systems

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission complex control systems for refrigeration and air conditioning	**1.1** WHS/OHS procedures are obtained and implemented in accordance with workplace procedures
	1.2 WHS/OHS risk control measures and procedures for work are followed
	1.3 Safety hazards not previously identified are documented

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		and risk control measures implemented
	1.4	Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5	System operating parameters are identified by reviewing system specifications and component technical data
	1.6	Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
	1.7	Preparatory work is checked to ensure damage has not occurred and is compliant with requirements
	1.8	Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	1.9	Circuits are checked as being isolated in accordance with WHS/OHS requirements and workplace procedures
2 Commission complex control systems for refrigeration and air conditioning	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system
	2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements
	2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate person/s, job specifications and requirements
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services applying sustainable energy principles

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3	**Complete and report commissioning activities**	**3.1** WHS/OHS risk control work completion measures and procedures are followed
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Adjustment settings and results of commissioning work are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning complex refrigeration and air conditioning control systems must include at least the following:

- two different complex control systems for refrigeration or air conditioning

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ126A Commission complex refrigeration/air conditioning control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0012 Commission complex refrigeration/air conditioning control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying system operating parameters
- measuring and adjusting system components and controls to provide optimum system performance
- ensuring system operates within regulatory requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - applying sustainable energy principles and practices
  - hazard identification and reporting
  - implementing risk control measures
- commissioning complex control systems for refrigeration/air conditioning
- completing and reporting commissioning activities
- determining need to test or measure live work
- isolating circuits
- preparing to commission complex control systems for refrigeration and air conditioning
- using relevant tools, equipment, testing and measuring devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex refrigeration/heating, ventilation and air conditioning (HVAC) control system commissioning, safe working practices and relevant standards, codes and regulations, including:

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- commissioning fundamentals:
  - building specifications/requirements/responsibilities
  - design and ‘as-installed’ drawings
  - building codes
  - local government regulations
  - design conditions
  - pre-commissioning checks
  - calibration of instruments
  - commissioning procedures
  - data collection, recording and, documentation
  - reporting procedures
- control fundamentals:
  - control terminology
  - refrigeration system characteristics
  - HVAC system characteristics
  - control system characteristics
  - control system components
  - control system diagrams and symbols
  - product knowledge
- commissioning various types of control equipment:
  - electrical:
    - sensors
    - controllers
    - flow control devices
    - control systems diagrams
  - electronic:
    - sensors
    - controllers
    - control system diagrams
- digital control systems:
  - system diagrams
  - control diagrams
  - configuration
  - programming
  - initialisation
  - EMS and BMS
  - supervisory control and data acquisition (SCADA) system
  - lan and Bacnet
- relevant manufacturer specifications

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- relevant plant and equipment
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures
- system operating parameters.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0013 Commission refrigeration/air conditioning hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to commission, set up and adjust hydronic systems for refrigeration and/or air conditioning optimum performance.

It includes applying safe working practices, testing and analysing system parameters, adjusting equipment and controls, following workplace procedures and documenting final operating parameters and settings.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to commission	**1.1** WHS/OHS procedures are obtained and implemented in

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	hydronic systems for refrigeration/air conditioning		accordance with workplace procedures
		1.2	WHS/OHS risk control measures and procedures for work are followed
		1.3	Safety hazards not previously identified are risk assessed and documented and risk control measures implemented
		1.4	Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
		1.5	System operating parameters are identified by reviewing system specifications and component technical data
		1.6	Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
		1.7	Preparatory work is checked to ensure damage has not occurred and is compliant with requirements
		1.8	Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
		1.9	Circuits are checked as being isolated in accordance with WHS/OHS requirements and workplace procedures
2	**Commission hydronic systems for refrigeration/air conditioning**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2	Testing/measuring devices are connected and set up in accordance with requirements for a particular system
		2.3	Measurements and adjustments are made to equipment components and controls to provide optimum system performance in accordance with system specifications and regulatory requirements
		2.4	Decisions for dealing with unexpected situations are made from discussions with appropriate person/s, job specifications and requirements

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	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Commissioning is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services applying sustainable energy principles
3 Complete and report commissioning activities	**3.1**	WHS/OHS risk control work completion measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Adjustment settings and results of commissioning work are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Commissioning refrigeration and air conditioning hydronic systems must include at least the following:

- two different hydronic systems for refrigeration and/or air conditioning systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ124A Commission refrigeration/ air conditioning hydronic systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0013 Commission refrigeration/air conditioning hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying system operating parameters
- measuring and adjusting system components and controls to provide optimum system performance
- ensuring system operates within regulatory requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - applying sustainable energy principles and practices
  - hazard identification and reporting
  - implementing risk control measures
- commissioning hydronic systems for refrigeration and/or air conditioning systems
- completing and reporting commissioning activities
- determining need to test or measure live work
- isolating circuits
- preparing to commission hydronic systems for refrigeration/air conditioning
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hydronic system commissioning, safe working practices and relevant standards, codes and regulations, including:
  - commissioning fundamentals:

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    - building specifications/requirements/responsibilities
    - design and ‘as-installed’ drawings
    - building codes
    - local government regulations
    - design conditions
    - pre- commissioning checks
    - calibration of instruments
    - commissioning procedures
    - data collection, recording and documentation
    - reporting procedures
- hydronic systems operation:
    - closed/open systems
    - pump head/lift and static head (high-rise building)
    - system friction losses
    - nett positive suction head
    - system curves
- pumps:
    - types
    - selection criteria
    - performance characteristics
    - pump curves and system curves
    - pump testing
    - capacity calculations
    - bladder tanks
    - coil characteristics
    - heat exchangers: plate, shell and tube, and tube in tube
    - flow measurements: types
    - flow switchers
    - cooling towers: elementary cooling thermodynamics and types
- valves - flow control devices:
    - types and applications
    - balancing valves
    - throttling characteristics
    - flow measurements
    - selection and applications
- piping systems:
    - balancing and commissioning
    - air venting
    - water treatment

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    - vacuum breaking and air breaks
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0014 Design ammonia refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design ammonia refrigerated systems.

It includes designing ammonia refrigerated systems based on a design brief and customer requirements, applying relevant industry standards, selecting components and documenting system design.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

UEERA0016 Design commercial refrigeration systems and select components

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design ammonia refrigeration systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of the refrigeration system is determined from design specifications and/or in consultation with relevant person/s
	1.3	Safety systems are identified, obtained and applied in accordance with relevant industry standard
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design ammonia refrigeration systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant ammonia refrigeration system analysis, components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
	2.4	Equipment required is selected in accordance with the design specifications and workplace procedures
	2.5	Location of components is documented in accordance with workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance with the design brief and regulatory requirements
	2.7	System design is documented for submission to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for engineering computer applications design	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace

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procedures

3.3 Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing ammonia refrigeration systems must include at least two different systems of the following:	• two single-stage, or • two multi-stage, or • one single-stage and one multi-stage

Designing ammonia refrigeration systems must include at least the following:	• one major component, including:
	  • condenser
	  • compressors
	  • evaporator
	  • flash chamber/flash intercooler
	• associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ181A Design ammonia refrigerated systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0014 Design ammonia refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing ammonia refrigeration systems
- preparing to design ammonia refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ammonia refrigeration system design, components and piping design requirements, safe working practices and relevant standards, codes and regulations, including:
  - technical standards, codes and regulations:
    - environmental and safety considerations in the use and disposal of ammonia refrigerant:
      - toxicity of ammonia, the effects on human health and the legislative limitations imposed on ammonia refrigerant as a result
      - flammability of ammonia, concentration and lower explosive limit (LEL)
      - environmental effects
      - safe disposal
      - safety data sheets (SDS)/material safety data sheets (MSDS) samples

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        - registration requirements for transport and on-site use
        - relationship between ammonia system refrigerant charge and dangerous goods storage regulations
        - engine ventilation requirements and determination of ventilation rates
        - scrubbers for elimination of the harmful effects of ammonia
- ammonia refrigeration system design requirements:
    - applications of ammonia refrigerant (NH3) in industrial refrigeration:
        - introduction to industrial ammonia refrigeration applications and systems
        - applications in industrial refrigeration: cool and cold storage, food processing, beverage manufacturing plants, fertilizer plants and second compression stage of CO2 systems
        - application in environment control and air conditioning: large scale reticulated water/secondary refrigerant systems
        - advantages and disadvantages of ammonia refrigerant compared with other natural and synthetic refrigerants
    - properties, application and limitations of ammonia refrigerant:
        - general classification of ammonia refrigerant according to AS/NZS 1677 Refrigerating systems SAA refrigeration code refrigerating systems
        - common contaminants in ammonia refrigeration systems, water, oil, non-condensable and the effects of same on cycle efficiency and system wear
        - refrigeration machine oils soluble in ammonia, oil type, applications and reactions with water
        - thermal and transport properties of ammonia in comparison with other natural and synthetic refrigerants, including the behaviour in a vapour compression cycle
    - application concepts and principles:
        - single stage vapour compression cycles with dry expansion refrigerant feed
        - single and dual stage vapour compression cycles with liquid overfeed
        - single stage vapour compression cycles with screw compressors and liquid overfeed
        - cascade ammonia/CO2 systems with dry expansion and liquid overfeed
        - single and dual stage vapour compression cycles with gravity flooded refrigerant feed
        - single and dual stage vapour compression cycles with ammonia used as a volatile secondary refrigerant
        - dual stage vapour compression cycles with multiple (>2) saturation temperature levels
        - automatic defrost principles, including off-cycle air defrost, ambient air defrost, hot gas defrost, electric defrost and water defrost
        - selection and sizing of ammonia pumps for liquid overfeed systems
        - selection and sizing of high pressure and low-pressure vessels
        - refrigerant pipe sizing using ammonia refrigerant
        - selection of suitable refrigerant oil

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- ammonia refrigeration system components and piping:
  - corrosion and material selection:
    - materials compatibility table
    - thermal and other properties of materials in use
    - pipe material and jointing methods/materials
    - compressors
    - pumps, impellers and seals
    - isolation and control valves
    - heat exchangers
  - pipe and insulation materials, pipe stresses and pipe suspension methods:
    - mild steel pipe
    - stainless steel pipe
    - sharpy tested pipe
    - post-installation insulation (in situ foaming, formed insulation and closed cell flexible insulation)
    - pre-insulated pipe material
    - vapour barrier – importance and maintenance
  - heat exchangers:
    - finned air coolers or evaporators - induced draught; forced draught; stainless steel/aluminium; mild steel galvanized; all aluminium; stainless steel/AlMg3; all stainless steel; description of what materials are used where and for what reason; various refrigerant feed methods including advantages/disadvantages i.e. top feed, bottom feed, vertical up flow/down flow of air; fin spacing; fin thickness and impact of geometry on fluid pressure drops
    - condensers – evaporative, air cooled, air cooled adiabatically assisted, water cooled shell and tube, water cooled plate/plate, water cooled plate and shell, cascade shell and tube, cascade plate/plate, cascade plate and shell, material selection for condensers, and importance of discharge temperature for condenser design
    - cooling towers
    - intercoolers and economisers of the closed type, sizing of liquid sub-cooling coils and tube bundles
    - liquid coolers or evaporators – plate/plate, plate/shell, shell and tube, material selections, refrigerant feed methods and oil management
    - screw compressor oil coolers – plate/plate type, shell and tube type, water cooled, refrigerant cooled and surface enhancement options
    - heat recovery – shell and tube de-superheaters, plate/plate de-superheaters and heat recovery condensers of various types
  - system control and monitoring:
    - compressor capacity control – pressure and temperature signals
    - room temperature and humidity control – understanding the principle of cooling and re-heating air streams to control absolute moisture contents

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        - control of condensers – optimisation of overall plant C.O.P
        - floating condensing pressures
        - control of fluid temperatures within the system – oil, secondary refrigerants and sub-cooling
        - control of flows – thermostatic expansion valves, low pressure floats, high pressure floats, motorised valves, electronic expansion valves, hand regulating valves, and oil return systems between compressor oil separators and compressors
        - pressure controllers - evaporating pressure controllers, thermostatic controllers, hot gas bypass valves, crankcase pressure regulators, overflow valves, ammonia pump pressure control, flow controllers and defrost pressure controllers
        - defrost control
        - programmable logic controller (PLC) control systems
        - supervisory control and data acquisition (SCADA) systems
    - water treatment and desiccant dehumidifiers:
        - condenser water treatment – purpose and legislative requirement
        - treatment of secondary refrigerant loops including monitoring
        - desiccant dehumidifiers and their role in infiltration minimisation, defrost control and energy savings
    - equipment selection:
        - use computer software and manufacturers' data to select major components of an ammonia refrigeration plant
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0015 Design carbon dioxide refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design carbon dioxide (CO^2) refrigerated systems.

It includes applying refrigeration systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system design.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0016 Design commercial refrigeration systems and select components

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design CO^2 refrigeration systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of the refrigeration system is determined from design specifications and/or consultations with relevant person/s
	1.3	Safety and system are identified, obtained and applied in accordance with relevant industry standards
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design CO^2 refrigeration systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant CO^2 refrigeration system analysis, components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the installation specifications
	2.4	Equipment required is selected in accordance with the design specifications and workplace procedures
	2.5	Location of components is documented in accordance workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.7	System design is documented for submission to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for design	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures

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3.3 Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing CO^2 refrigeration systems must include at least the following:	• two of the following:
	  • two sub-critical or
	  • two trans-critical or
	  • one sub-critical and one trans-critical
	• major components:
	  • cooler
	  • condenser
	  • compressor
	  • evaporator
	• associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ187A Design carbon dioxide refrigerated systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0015 Design carbon dioxide refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing carbon dioxide (CO^2) refrigeration systems
- preparing to design CO^2 refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, and performance criteria and range of conditions and include knowledge of:

- CO^2 refrigeration system design requirements, components and piping design requirements, safe working practices and relevant standards, codes and regulations, including:
  - technical standards, regulations and codes for carbon dioxide refrigeration systems:
    - standard philosophy and format
    - standards, regulations and codes that apply to CO2 refrigeration systems
    - equipment manufacturer's specifications
  - CO^2 refrigeration system design requirements:
    - possible areas of applications of CO2 refrigeration systems:
      - mobile air conditioner
      - heat pump water heater

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        - commercial refrigeration
    - thermodynamic properties of CO2:
        - CO2 phase diagram
        - CO2 properties tables and chart
    - conventional refrigeration cycle versus CO2 refrigeration cycle:
        - T-s and pH diagram representations
        - isentropic efficiency
        - volumetric efficiency
    - types of CO2 refrigeration system configurations:
        - sub-critical operation
        - trans-critical operation
        - cascade systems
    - performance analysis of CO2 refrigeration systems
        - sub-critical cycle
        - trans-critical cycle
        - cascade systems
- CO^2 refrigeration system components and piping:
    - design preliminaries:
        - system operating parameters
        - project specifications
        - equipment selection criteria
        - selection tables, charts and catalogues
    - heat exchanger selection:
        - selection of evaporators
        - selection of condensers
        - selection of coolers
    - compressor selection
    - liquid expansion devices selection
    - system load balance point
    - refrigeration line design and sizing
    - automatic controls
    - safety devices
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0016 Design commercial refrigeration systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design commercial refrigeration systems and select components.

It includes applying processes and methods of refrigeration and food storage technology, refrigeration system components and piping, and safety and regulatory requirements. It also includes following design specifications and customer requirements, documenting system designs and obtaining approval for engineering computer applications design.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design commercial refrigeration systems	**1.1** WHS/OHS procedures are identified, obtained and implemented in accordance with workplace procedures

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	1.2	Scope of the refrigeration system is identified from design specifications
	1.3	System safety, regulatory and compliance requirements are identified and applied
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system in accordance with relevant documentation
	1.5	Design development work is planned in consultation with relevant person/s involved to meet scheduled timelines
2 Design commercial refrigeration systems	**2.1**	WHS/OHS risk control measures and procedures are followed in accordance with workplace procedures
	2.2	Relevant refrigeration, food storage, technology refrigeration system components, piping and performance standards are applied to the system design in accordance with relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
	2.4	Equipment required is selected in accordance with design specifications and workplace procedures
	2.5	Location of components in the system is documented in accordance with workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance in accordance with design brief and relevant industry standards
	2.7	System design is documented and submitted to relevant person/s for approval in accordance with workplace procedures
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for commercial refrigeration systems design	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace

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procedures

3.3 Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing commercial refrigeration systems must include at least the following:	• two different commercial refrigeration systems with one of the following:
	  • condenser
	  • compressor
	  • evaporator
	  • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ132A Design commercial refrigeration systems and select components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0016 Design commercial refrigeration systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- designing commercial refrigeration systems
- preparing to design commercial refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial refrigeration system design, safe working practices and relevant standards, codes and regulations, including:
  - food spoilage and possible causes:
    - physical damage
    - animal activity
    - chemical breakdown
    - enzyme activity
    - microorganisms
    - effects of temperature change
    - effects of humidity change

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    - effects of freezing on fresh produce
    - effects of slow freezing time
    - effect of refreezing
  - food preservation:
    - removing or taking out a reactant
    - removing or inactivating the catalyst
    - reducing temperature
    - changing the reaction system
    - irradiation
  - microorganisms:
    - conditions for growth
    - potentially hazardous foods
    - cross-contamination
  - identification of food spoilage:
    - recognition and suggest possible cause
    - physical damage
    - animal activity
    - chemical breakdown
    - enzyme activity
    - microorganisms
  - types of heat processing techniques:
    - heat processing using steam and water
    - blanching
    - pasteurisation
    - sterilisation
    - evaporation
    - heat processing using hot air
    - dehydration
    - baking and roasting
  - types of chilling processing techniques:
    - chilling and controlled atmosphere storage
    - freezing
    - freeze drying and freeze concentration
    - modified atmosphere combined with low temperature cryovac
  - equipment manufactures specifications and practices
- refrigeration system components and piping selection, safe working practices and relevant standards, codes and regulations, including:
  - relevant industry practices:
    - AS/NZS 1677 Refrigerating systems SAA refrigeration code
    - AS/NZS 3666 Air-handling and water systems of buildings

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    - ozone protection regulations
    - IIAR ammonia data book
    - ANSI/IIAR standards
    - ANSI/ASHRAE mechanical refrigeration and IIAR
    - bulletins and standards
    - equipment manufacturer's specifications and practices
- calculation of capacity in heat exchangers:
    - Q = UA (LMTD)
    - Q = mcΔt
    - Q = m Δh
- evaporators:
    - commercial types and applications
    - coil bypass factor
    - effects of evaporator TD on space humidity
    - effects of air circulation on product conditions
    - selection criteria and selection tables
- condensers:
    - commercial types and applications
    - effects of ambient conditions
    - condenser control
    - heat rejection factor
    - condenser TD
    - selection criteria and selection tables
- compressors:
    - types and applications
    - capacity
    - displacement
    - volume flow rate
    - theoretical capacity
    - total volumetric efficiency
    - effect of operating conditions, including suction
    - pressure drop and superheating
    - actual capacity
    - power
    - theoretical requirement
    - effects of operating conditions
    - actual requirements
    - post defrost loads
    - pull down torque requirements, high and medium

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    - and low back pressure compressors
    - selection tables, motor selection
- liquid expansion devices:
    - types, operation and applications
    - effects from sub-cooling
    - distributor types, operation and applications
    - selection tables
    - system load balance point
    - graphical representation
    - line sizing and design
    - velocity tables
    - pressure drop in lines and fittings
    - oil migration stabilisation
    - refrigerant velocity
    - effect of varying system capacity
    - oil traps
    - risers
    - double risers
    - liquid migration
    - design for parallel components and multiplex systems
- automatic controls:
    - fin spacing, suction temp to evaporator suction
    - hot-gas bypass valves
    - electronic control of valves and programmable logic controllers (PLC)
    - refrigerant regulating valves
    - solenoid valves
    - condenser pressure regulating valves
    - evaporator pressure regulating valves
    - crankcase pressure regulating valves
    - cycling controls
    - pressure-stats
    - thermostats
    - defrost controls
    - monitoring and alarm controls
    - refrigeration automation systems
    - control strategies
    - control modes
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0017 Design complex air conditioning systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design complex air conditioning systems and select equipment.

It includes applying processes and methods of complex air conditioning systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0022 Design heating, ventilation and air conditioning (HVAC) systems and select components

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

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UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design complex air conditioning systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work

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	1.3	Scope of the refrigeration system is determined from the design brief and/or consultations with relevant person/s
	1.4	Design development work is planned in accordance with workplace procedure for timelines in consultation with others involved
2 Design complex air conditioning systems	**2.1**	Relevant complex air conditioning processes and methods are applied to the design
	2.2	Alternative concepts for design are evaluated in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
	2.4	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.5	System design is documented for submission to relevant person/s for approval
	2.6	Unplanned events are dealt with in accordance with problem solving techniques and workplace procedures
3 Obtain approval for complex air conditioning systems design	**3.1**	System design is presented to customer and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
	3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing a complex air conditioning system must include at least the following:

- one major component, including:
  - air handling plant
  - compressors
  - condenser
  - evaporators
- circuits and/or systems
- associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ143A Design complex air conditioning systems and select equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0017 Design complex air conditioning systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing complex commercial refrigeration system
- preparing to design complex air conditioning system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex heating, ventilation and air conditioning (HVAC) system design, safe working practices and relevant standards, codes and regulations, including:
  - HVAC load estimating of multiple zone and multi-storey buildings:
    - system design parameters:
      - human comfort
      - system requirements in accordance with AS 1668 The use of ventilation and air conditioning in buildings SAA refrigeration code
      - heat transfer calculations for complex structures and building components
      - heat and radiation transfer calculations through complex glass structures including various internal and external shading devices
      - indoor air quality

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    - olfs and decipols
  - complex shading:
    - solar data, azimuth and altitude angles
    - shading from adjacent structures
  - computer software:
    - heat load estimating
    - building thermal performance analysis and simulation software
- advanced psychrometrics:
  - complex psychrometric processes:
    - revise sensible cooling and heating and evaporative (adiabatic) cooling
    - cooling and dehumidification
    - cooling and dehumidification with high latent load
    - cooling and dehumidification all outdoor air
    - cooling and dehumidification all outdoor air with dehumidified air requirements less than supply air
    - cooling with evaporative humidification
    - cooling with near isothermal humidification
    - spray process to include cooling and dehumidification, cooling and humidification with heated spray water, heating and humidification
    - partial load processes
    - reheat
    - bypass of, RA only and mix of RA and OA
    - variable air volume
    - variable coil effective surface temperature
    - split coil, horizontal, vertical and intertwined
  - system performance:
    - saturation efficiency of sprayers
    - system capacity calculated from air quantity and enthalpy change
  - required plant capacity and airflow rates:
    - effects of coil bypass factor and ADP
    - calculation of dehumidified air quantity, using both TSH and ERSH methods
  - recap on psychrometrics formulae and charts:
    - properties of air
    - gas constants
    - derivation of air constants
    - combined gas laws
    - Dalton’s law of partial pressures
    - carrier’s equation
    - psychrometric property tables
    - psychrometric charts

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    - air mixing equations
    - air quantity equations
    - indirect evaporative coolers
    - analysis of cooling coil selection and performance
    - psychrometric analysis of:
    - air conditioning in tropics
    - all outdoor air
    - LCV/HWF systems
    - psychrometric analysis using equations and tables
- air conditioning system design:
  - design parameters for multi-storey building:
    - customer and objective
    - customer concept of environment desired
    - economic
    - client brief
  - relevant design criteria:
    - building purpose, location, orientation and shape
    - external environment ambient conditions
    - internal load diversity
    - thermal capacity behaviour
    - thermal load (full and partial)
  - zoning and building usage:
    - space and building
    - occupancies, single purpose and multi-purpose
  - system selection criteria:
    - economics
    - environment
    - control requirements
    - existing structures
    - new structures
    - system components
    - space for equipment and system
    - selection of appropriate system
  - system and applications:
    - design features, engineering procedures and controls
    - direct expansion - self-contained room/zone, heat pump, multi-zone fan-coils and central station
    - all water - room fan-coil
    - all-air - constant volume variable temperature, face and bypass, reheat, constant temperature variable volume, constant volume induction, dual-duct and

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dual-conduit
    - air water - induction unit and primary air fan-coil
- HVAC energy conversation techniques:
    - heat recovery systems
    - night cycle
    - optimum stop/start
    - purge cycles
    - chiller/boiler/cooling tower sequencing
    - economy cycles (based on temperature or enthalpy)
    - supply air reset
    - supply water reset
    - condenser water temperature reset
    - power demand control
    - load limiting
    - load shedding
    - set point relaxation
    - ventilation cycles
    - plant - fixed OA to economy, boiler to electric reheat and constant volume to variable air volume (VAV)
    - cost-benefit (payback)
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0018 Design complex commercial refrigeration systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design complex commercial refrigeration systems and select equipment.

It includes applying processes and methods of complex commercial refrigeration systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0016 Design commercial refrigeration systems and select components

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

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UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design complex commercial	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied

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	refrigeration system		
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
		1.3	Scope of the proposed refrigeration system is determined from the design brief and/or consultations with relevant person/s
		1.4	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2	**Design complex commercial refrigeration system**	**2.1**	Relevant commercial refrigeration processes and methods are applied to the design
		2.2	Alternative concepts for design are evaluated in accordance with the design brief
		2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
		2.4	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
		2.5	System design is documented and submitted to relevant person/s for approval in accordance with workplace procedures
		2.6	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3	**Obtain approval for complex commercial refrigeration system design**	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
		3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
		3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing a complex commercial refrigeration system must include at least the following:	• one multiple major component, including: • compressors • condenser • evaporators • circuits and/or systems • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ141A Design complex commercial refrigeration systems and select equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0018 Design complex commercial refrigeration systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing complex commercial refrigeration system
- preparing to design complex commercial refrigeration system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex commercial refrigeration system design, safe working practices and relevant standards, codes and regulations, including:
  - commercial refrigeration system types:
    - medium and low temperature applications
    - operating conditions
    - system operating and service requirements
    - refrigerant types
    - components
    - multiple evaporator systems
    - multiple temperature systems

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    - multiple compressor (rack) systems
    - two stage compressors
    - multiplex systems
    - defrost requirements and methods
    - electric defrost systems
    - hot gas defrost systems
    - cool gas defrost systems
- manufacturer's data:
    - rating tables
    - selection tables
    - catalogues
- operating characteristics:
    - effects of temperature glide with blended refrigerants
    - pH charts
    - refrigerating effect
    - heat of compression
    - heat rejected on high side of the system
    - required mass flowrate of refrigerant
    - volume flowrate at various points in system
    - theoretical compressor power
    - required condenser capacity
- refrigerant flow controls:
    - refrigerant regulating valves
    - solenoid valves
    - expansion valves
    - pressure regulating valves
- automatic systems controls:
    - cycling controls
    - pressure-stats
    - thermo-stats
    - defrost controls
    - monitoring and alarm controls
    - energy management systems
    - refrigeration automation system
    - control strategies
    - control modes
- system design:
    - required cooling capacity per day
    - running time and required system cooling capacity

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    - system capacity control for peak and low load
    - refrigeration system diagrams
    - refrigerant, equipment, major component, controls, piping and accessory selection
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational suitable situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0019 Design complex control systems for refrigeration or heating, ventilation, air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design complex control systems for heating, ventilation and air conditioning/refrigeration (HVAC/R) systems.

It includes applying processes and methods of complex control systems for a HVAC/R system, safety and relevant industry standards; developing alternative design schemes based on design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0021 Design control systems for refrigeration or heating, ventilation and air conditioning systems

UEERA0060 Produce HVAC/R control system diagrams

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

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UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design complex HVAC/R control systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Scope of the HVAC/R system is determined from the

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			design brief and/or consultations with relevant person/s
		1.4	Design development work is planned in accordance with workplace procedure for timelines in consultation with others involved
2	**Design complex HVAC/R control systems**	**2.1**	Relevant complex control processes and methods are applied to the design
		2.2	Alternative concepts for design are evaluated in accordance with the design brief
		2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
		2.4	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
		2.5	System design is documented for submission to relevant person/s for approval
		2.6	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3	**Obtain approval for complex HVAC/R control systems design**	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
		3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
		3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing control systems for HVAC/R must include at least the following:

- two different complex control systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ146A Design complex control systems for refrigeration or heating, ventilation, air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0019 Design complex control systems for refrigeration or heating, ventilation, air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing complex heating, ventilation and air conditioning/refrigeration (HVAC/R) control systems
- preparing to design complex HVAC/R control systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex HVAC/R control system design, safe working practices and relevant standards, codes and regulations, including:
    - advanced HVAC/R control system design:
        - control diagrams:
            - Australian standard and non-standard symbols as used in a variety of typical HVAC/R systems
            - control diagrams
            - electric/electronic control diagrams
            - electrical installation documents

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        - pneumatic diagrams
        - direct digital control (DDC) diagrams
        - controls/electrical power circuit interface
        - nomographs
        - extraction of specific information relating to the operation and control of plant from a variety of typical HVAC/R control diagrams
        - development of control diagrams to required standards given specific system operating parameters
    - control design requirements:
        - standard and statutory requirements
        - economy of operation (energy management)
        - the desired or most appropriate system operating logic for a specified HVAC/R system
        - appropriate mode of control for a specified HVAC/R system
        - control system type selection for specific applications with due to regard to plant size, application, operating environment, available control power supply options, economy and computability to existing or proposed plant and control system
        - components required to assemble and operate the control system of a specified HVAC/R system
- HVAC/R system energy conservation methods:
    - HVAC/R system control:
        - night cycle
        - optimum stop/start
        - purge cycles
        - chiller/boiler/cooling tower sequencing
        - economy cycles (based on temperature or enthalpy)
        - supply air reset
        - condenser water temperature reset
    - electrical load control:
        - power demand control
        - load limiting
        - load shedding
        - set point relaxation
        - ventilation cycles
- building management systems:
    - functions of a building management system:
        - autonomous functions
        - input/output (I/O)
        - general I/O
        - installation management items
        - energy management

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        - risk management
        - information processing
        - objectives
        - building running costs
        - smoke control as per AS 1668.1 The use of ventilation and air conditioning in buildings - Fire and smoke control in buildings
    - building management system hardware:
        - system architecture
        - communication devices
        - substations
        - personal computers
        - interfaces with other systems
    - I/O functions:
        - digital - I/O
        - digital output with status feedback
        - analogue input/output
        - sensors
        - alarms
- control sequences
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0020 Design complex industrial refrigeration systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design complex industrial refrigeration systems and select equipment.

It includes applying system processes and methods of industrial refrigeration systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0025 Design industrial refrigeration systems and select components

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0016 Design commercial refrigeration systems and select components

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning

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installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to design complex industrial refrigeration system**	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
		1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
		1.3 Scope of the refrigeration system is determined from the design brief and/or consultations with relevant person/s
		1.4 Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2	**Design complex industrial refrigeration system**	**2.1** Relevant industrial refrigeration system processes and methods are applied to the design
		2.2 Alternative concepts for design are evaluated in accordance with the design brief
		2.3 Safety, functionality and budgetary considerations are incorporated in the design specifications
		2.4 System design draft is checked for compliance in accordance with the design brief and relevant industry standards
		2.5 System design is documented and submitted to relevant person/s for approval in accordance with workplace procedures
		2.6 Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3	**Obtain approval for complex industrial refrigeration system design**	**3.1** System design is presented to customer and/or relevant person/s in accordance with workplace procedures
		3.2 Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3 Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
		3.4 Quality of work is monitored in accordance with

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workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing a complex industrial refrigeration system must include at least the following:	• one multiple major component, including:
	  • compressors
	  • condenser
	  • evaporators
	  • circuits and/or systems
	  • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ142A Design complex industrial refrigeration systems and select equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0020 Design complex industrial refrigeration systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant industrial refrigeration system processes and methods
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using rick control measures
- designing complex commercial refrigeration system
- preparing to design complex industrial refrigeration system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- complex industrial refrigeration system design, safe working practices and relevant standards, codes and regulations including:
  - AS/NZS 1677 Refrigerating systems SAA refrigeration code
  - ANSI/IIAR standards
  - ANSI/ASHRAE standards
  - IIAR bulletins
- moderate and low temperature industrial refrigeration systems:
  - direct, flooded and pumped liquid recirculation systems
  - evaporators
  - multi-staged compression

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    - direct staging
    - cascade staging
    - compound compressors
    - de-superheaters and liquid injection
    - direct expansion intercoolers
    - open and closed intercoolers
    - basic designs of accumulators/intercooler vessels
    - oil cooling methods
    - oil stabilisation, return and oil recovery in flooded systems
- multiple evaporators and multiple compressors:
    - parallel evaporators
    - multiple temperature systems
    - evaporator pressure regulators
    - temperature control methods
    - parallel compressors
    - pipe work layout
    - methods of establishing pressure drop in dry and wet suction lines
- indirect refrigeration systems:
    - classification according to AS/NZS 1677 Refrigerating systems SAA refrigeration code
    - applications
    - evaporators
    - heat exchangers, types, construction and selection
    - secondary refrigerants
    - brines
    - antifreeze solutions
- flooded systems:
    - applications
    - equipment
    - accumulators
    - level controls
    - liquid recirculation pumps
    - liquid pressure relief valve
- cryogenic systems:
    - applications and equipment
    - system components
    - refrigerants
    - design safety
    - economics
    - cascade systems

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- basic control sequences:
  - maintaining evaporator conditions
  - staging and suction pressure control
  - maintaining condenser conditions
  - control of intermediate pressure, methods of industrial refrigeration compressor capacity control
- system design:
  - required cooling capacity per day
  - running time and required system cooling capacity
  - system capacity control for peak and low load
  - refrigeration system diagrams
  - refrigerant, equipment, major component, controls, piping and accessory selection
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0021 Design control systems for refrigeration or heating, ventilation and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design control systems for heating, ventilation and air conditioning/refrigeration (HVAC/R) systems.

It encompasses applying processes and methods of HVAC/R control systems components, safety and relevant industry standards. It also includes following design specifications and customer requirements, and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0060 Produce HVAC/R control system diagrams

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

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UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design control systems for HVAC/R	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the HVAC/R system is determined from design specifications and/or in consultations with relevant person/s
	1.3 Safety and systems are identified, obtained and applied in accordance with relevant industry standards

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	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design control systems for HVAC/R	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant control system components are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated into the design
	2.4	Control equipment required is selected in accordance with design specifications and workplace procedures
	2.5	Location of components are documented in accordance with workplace procedures and operation of system functions
	2.6	Control system design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.7	Control system design is documented and submitted to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for control systems for HVAC/R systems design	**3.1**	Control system design is presented and explained to customer and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing control systems for HVAC/R must include at least the following:	• two different HVAC/R systems, including one of the following:
	  • condenser
	  • compressor
	  • evaporator
	  • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ135A Design control systems for refrigeration or heating, ventilation and air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0021 Design control systems for refrigeration or heating, ventilation and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- designing control systems for heating ventilation and air conditioning/refrigeration (HVAC/R) systems
- preparing to design control systems for HVAC/R.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC/R design control systems, system operating requirements, integration of electrical, electronic, pneumatic and digital controls, safe working practices and relevant standards, codes and regulations, including:
  - control systems:
    - control terminology
    - control system characteristics
    - control system diagrams and symbols
  - types of control equipment:
    - electrical:

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        - classification of circuits
        - two position control
        - floating control
        - sensors
        - controllers
        - flow control devices
        - control systems diagrams
- electronic:
    - operating principles
    - sensors
    - controllers
    - control system diagrams
- pneumatic:
    - control fundamentals:
        - pneumatic control terminology
        - definitions
    - control basics:
        - air supply
        - pilot bleed system
        - signal amplifier
        - sensing elements
        - relays and switches
    - air supply system:
        - air drying methods
        - pressure regulating valves
        - pressure reducing valves
    - system controllers:
        - thermostats
        - sensors
        - actuators
        - dampers
    - system control configuration:
        - sequence control
        - limit control
        - changeover control
        - compensated control
        - recycling control
        - pneumatic – electric control
    - control systems

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- digital control systems:
  - computer-based control fundamentals
    - definitions
    - principles
- controller configuration:
  - equipment
  - zone level controllers
  - system level controllers
- controller software:
  - operating software
  - application software
- controller programming:
  - system diagrams
  - control diagrams
  - configuration
  - programming
  - initialisation
  - EMS and BMS
  - supervisory control and data acquisition (SCADA) system
  - lan and Bacnet
- applications:
  - refrigeration systems
  - HVAC systems:
    - air handling system controls
    - ventilation
    - heating
    - building airflow system control
    - airflow control
    - single and multi-zones
    - chiller boiler and distribution system
  - logic analysis
  - energy management
  - asset management
  - life cycle
  - supervisory:
    - introduction building management
    - remote building control interface and modem
- problem-solving techniques
- relevant industry standards, codes of practice, regulations and industry practices

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- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0022 Design heating, ventilation and air conditioning (HVAC) systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design heating, ventilation and air conditioning (HVAC) systems and select components.

It includes applying processes and methods of HVAC systems, components and piping, safety and relevant industry standards. It also includes following design specifications and customer requirements, and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design HVAC systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the refrigeration system is determined from design specifications and/or in consultations with

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		relevant person/s
	1.3	Safety and systems are identified, obtained and applied in accordance with relevant industry standards
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design HVAC systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant refrigeration and food storage technology, refrigeration system components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the installation design
	2.4	Equipment required is selected in accordance with design specifications and workplace procedures
	2.5	Location of components are documented in accordance with workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.7	System design is documented and submitted to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for HVAC design	**3.1**	System design is presented and explained to customer and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from

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relevant person/s

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing HVAC systems must include at least the following:	• two different HVAC systems, including at least one of the following:
	  • condenser
	  • compressor
	  • evaporator
	  • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ134A Design heating, ventilation and air conditioning (HVAC) systems and select components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0022 Design heating, ventilation and air conditioning (HVAC) systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing heating, ventilation and air conditioning (HVAC) systems
- preparing to design HVAC systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial HVAC system design, safe working practices and relevant standards, codes and regulations, including:
  - design parameters for single-storey buildings (e.g. offices, restaurants, hotels and bars):
    - customer and objective
    - customer concept of environment desired
    - economics
    - client brief
  - relevant design criteria:
    - building purpose, location, orientation and shape

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- external environment ambient conditions
- internal load diversity
- thermal capacity behaviour
- thermal load (full and partial)

- zoning and building usage:
  - space and building
  - occupancies, single purpose and multi-purpose
- system selection criteria:
  - economics
  - environment
  - control requirements
  - existing structures
  - new structures
  - system components
  - space for equipment and system
  - selection of appropriate system, equipment, ductwork and components
- systems and applications:
  - design features, engineering and selection procedures for direct expansion air conditioning systems:
    - air conditioning split systems and package units
    - free blow and ducted fan coil units
    - cooling, heat pump and electric heating
  - air conditioning system components and piping selection
- air conditioning system components and piping selection, safe working practices and relevant standards, codes and regulations, including:
- relevant industry practices:
  - AS/NZS 1677 Refrigerating systems SAA refrigeration code
  - AS/NZS 3666 Air-handling and water systems of buildings
  - ozone protection regulations
  - ANSI/IIAR standards
  - ANSI/ASHRAE mechanical refrigeration and IIAR
  - bulletins and standards
  - equipment manufacturer’s specifications and practices
  - calculation of capacity in heat exchangers:
    - $Q = UA (LMTD)$
    - $Q = mc\Delta t$
    - $Q = m \Delta h$
  - evaporators
    - commercial types and applications
    - coil bypass factor

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    - effects of evaporator TD on space humidity
    - effects of air circulation on product conditions
    - selection criteria and selection tables
- condensers:
    - commercial types and applications
    - effects of ambient conditions
    - condenser control
    - heat rejection factor
    - condenser TD
    - selection criteria and selection tables
- compressors
    - types and applications
    - capacity
    - displacement
    - volume flow rate
    - theoretical capacity
    - total volumetric efficiency
    - effect of operating conditions, including suction
    - pressure drop and superheating
    - actual capacity
    - power
    - theoretical requirement
    - effects of operating conditions
    - actual requirements
    - post defrost loads
    - pull down torque requirements, high and medium
    - and low back pressure compressors
    - selection tables and motor selection
- liquid expansion devices:
    - types, operation and applications
    - effects from sub-cooling
    - distributor types, operation and applications
    - selection tables
    - system load balance point encompassing:
    - graphical representation
    - line sizing and design
    - velocity tables
    - pressure drop in lines and fittings
    - oil migration stabilisation

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    - refrigerant velocity
    - effect of varying system capacity
    - oil traps
    - risers
    - double risers
    - liquid migration
    - design for parallel components and multiplex systems
- automatic controls:
    - fin spacing, suction temp to evaporator suction
    - hot-gas bypass valves
    - electronic control of valves and programmable logic controllers (PLC)
    - refrigerant regulating valves
    - solenoid valves
    - condenser pressure regulating valves
    - evaporator pressure regulating valves
    - crankcase pressure regulating valves
    - cycling controls
    - pressure-stats
    - thermostats
    - defrost controls
    - monitoring and alarm controls
    - refrigeration automation systems
    - control strategies
    - control modes
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0023 Design hydrocarbon refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to Design hydrocarbon refrigerated systems.

It includes applying processes and methods of hydrocarbon refrigeration systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system design.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0016 Design commercial refrigeration systems and select components

UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design hydrocarbon refrigeration systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Scope of the refrigeration system is determined from design specifications and/or in consultation with relevant person/s
	1.3	Safety and systems are identified, obtained and applied in accordance with relevant industry standards
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design hydrocarbon refrigeration systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant hydrocarbon refrigeration system analysis, hydrocarbon refrigeration system components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the installation design
	2.4	Equipment is selected in accordance with the design specifications and workplace procedures
	2.5	Location of components is documented in accordance workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.7	System design is documented for submission to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for hydrocarbon refrigeration systems design	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures

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3.2 Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures

3.3 Final design is documented and approval obtained from relevant person/s

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing hydrocarbon refrigeration systems must include at least the following	• two different hydrocarbon refrigerated systems

Each hydrocarbon refrigerated system design must include at least one of the following:	• major component, including:
	  • condenser
	  • compressor
	  • evaporator
	• associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ177A Design hydrocarbon refrigerated systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0023 Design hydrocarbon refrigerated systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- designing hydrocarbon refrigeration systems
- preparing to design hydrocarbon refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hydrocarbon refrigeration systems design, components and piping design requirements, safe working practices and relevant standards, codes and regulations, including:
  - technical standards, regulations and codes for hydrocarbon refrigeration systems:
    - standard philosophy and format
    - standards, regulations and codes that apply to hydrocarbon refrigeration systems
    - equipment manufactures specifications
  - hydrocarbon refrigeration system design requirements:
    - applications of hydrocarbon refrigeration systems:
      - domestic refrigerators
      - commercial refrigeration

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- thermodynamic properties of hydrocarbon
  - hydrocarbon phase diagram
  - hydrocarbon properties tables and chart
- hydrocarbon refrigeration cycle:
  - Ph diagram representation
  - expansion, evaporation, compression and condensation processes
- performance analysis of hydrocarbon refrigeration systems:
  - refrigerating effect
  - heat of rejection
  - heat of compression
  - coefficient of performance
  - effects of suction superheating on cycle efficiency
  - effects of liquid sub-cooling on cycle efficiency
- actual hydrocarbon refrigeration cycles:
  - superheating inside and outside the refrigerated space
  - liquid-suction heat exchangers
  - pressure drop in piping due to friction and dynamic losses

- hydrocarbon refrigeration system components and piping:
  - design preliminaries:
    - system operating parameters
    - project specifications
    - equipment selection criteria
    - selection tables, charts and catalogues
  - materials used with hydrocarbon refrigerants
  - heat exchanger selection:
    - selection of evaporators
    - selection of condensers
  - compressor selection
  - liquid expansion devices selection
  - system load balance point
  - refrigeration line design and sizing
  - automatic controls
  - safety:
    - safety data sheets (SDS)/material safety data sheets (MSDS) for hydrocarbon refrigerants
- problem-solving techniques
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0024 Design hydronic systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design hydronic systems and select equipment.

It includes applying processes and methods of hydronic systems, safety and relevant industry standards; developing alternative design schemes based on a design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

Or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

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UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design hydronic systems and select equipment	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Scope of the proposed hydronic system is determined from the design brief and/or consultations with relevant person/s

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	1.4	Design development work is planned in accordance with workplace procedure for timelines in consultation with others involved
2 Design hydronic systems and select equipment	**2.1**	Relevant hydronic system processes and methods are applied to the design
	2.2	Alternative concepts for design are evaluated in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the design specifications
	2.4	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.5	System design is documented for submission to relevant person/s for approval
	2.6	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for hydronic system design and equipment selection	**3.1**	System design is presented to customer and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
	3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing hydronic systems must include at least the following:

- two different hydronic systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ145A Design hydronic systems and select equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0024 Design hydronic systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- designing hydronic systems and selecting equipment
- preparing to design hydronic systems and select equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- heating, ventilation and air conditioning/refrigeration (HVAC/R) hydronic system design, safe working practices and relevant standards, codes and regulations, including:
  - hydronic system design fundamentals:
    - principles of fluid flow
    - properties of fluids
    - flow of ideal fluids
    - fluid flow equipment
    - Bernoulli Theorem
    - fluid flow in pipes
  - pressure loss and static head – calculation:

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    - flow throughout system
    - pressure throughout system
    - friction losses
    - pressure loss charts for: copper, steel and unplasticised polyvinyl chloride (uPVC)
    - dynamic losses
    - fitting pressure losses
    - fitting interaction
    - total losses
    - calculating system (static and dynamic) head
- pump performance and selection:
    - pump classification and types
    - pump performance terminology, discharge, head, power, efficiency, speed and net positive suction head required
    - pump performance curves
    - pump laws
    - system head and ‘K’ factor
    - balance points
    - energy considerations
    - pump cavitation
    - calculation of net positive suction head available
    - series and parallel operation
- pipe sizing:
    - maximum friction rate
    - erosion and equipment life
    - industry standards
    - recommended system water velocities
    - economic balance - first cost and operating cost
- hot water systems:
    - boilers
    - coils
    - expansion tanks
    - pumps and characteristics curves
    - control valves, types and flow diagrams
    - air purge points
    - water treatment
    - pipe anchors and expansion joints
- chilled water systems:
    - chillers
    - coils
    - expansion tanks

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    - pumps and characteristics curves
    - control valves, types and flow diagrams
    - air purge points
    - water treatment
    - pipe anchors and expansion joints
- HVAC/R hydronic systems:
    - systems operation
    - closed/open systems
    - pump head/lift and static head (high-rise building)
    - system friction losses
    - nett positive suction head
    - system curves
- pumps:
    - types
    - selection criteria
    - performance characteristics
    - bladder tanks
    - coil characteristics
    - heat exchangers: plate, shell and tube, and tube in tube
    - flow measurements: types
    - flow switchers
    - builders: types and performance characteristics
    - cooling towers: elementary cooling thermodynamics and types
- valves - flow control devices:
    - types and applications
    - throttling characteristics
    - flow measurements
    - selection and applications
- hydronic system configuration and design:
    - piping configurations
    - single pipe closed circuit
    - two pipe closed circuit
    - direct return
    - three pipe closed circuit with reversed return
    - three-way diverting valves
    - risers and headers
    - component location
- evaluation of piping configurations:
    - capital cost

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    - owning and operating costs
    - noise vibration
    - maintenance
    - future expansion
    - commissioning and balancing
    - operating characteristics
    - cavitation
  - system pipe sizes:
    - pipe dynamic and friction losses for different materials
    - fitting pressure losses for different materials
    - thermal heat losses
    - bare, insulated and underground pipes
- air conditioning system design
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0025 Design industrial refrigeration systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design industrial refrigeration systems and select components.

It includes applying processes and methods of refrigeration and food storage technology, industrial refrigeration system components and piping, safety and relevant industry standards. It also includes following design specifications and customer requirements, and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0016 Design commercial refrigeration systems and select components

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design industrial refrigeration systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the refrigeration system is determined from

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		design specifications
	1.3	Safety and systems are identified, obtained and applied in accordance with relevant industry standards
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameter of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design industrial refrigeration systems	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Relevant refrigeration and food storage technology, refrigeration system components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the installation design
	2.4	Equipment required is selected in accordance with the design specifications and workplace procedures
	2.5	Location of components are documented in accordance with workplace procedures and operation of system functions
	2.6	System design draft is checked for compliance in accordance with the design brief and relevant industry standards
	2.7	System design is documented and submitted to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for industrial refrigeration design	**3.1**	System design is presented and explained to customer and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures

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3.3 Final design is documented and approval obtained from relevant person/s

3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing industrial refrigeration systems must include at least the following:	• two different industrial systems with one of the following:
	  • condenser
	  • compressor
	  • evaporator
	  • associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ133A Design industrial refrigeration systems and select components.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0025 Design industrial refrigeration systems and select components

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively,
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- designing industrial refrigeration systems
- preparing to design industrial refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial refrigeration systems design and component selection, fundamentals, safe working practices and relevant standards, codes and regulations including:
  - relevant industry practices:
    - AS/NZS 1677 Refrigerating systems SAA refrigeration code
    - AS/NZS 3666 Air-handling and water systems of buildings
    - ozone protection regulations
    - IIAR ammonia data book
    - ANSI/IIAR standards
    - ANSI/ASHRAE mechanical refrigeration and IIAR bulletins and standards (list will be provided by Rama)
    - equipment manufacturer’s specifications and practices

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- operating characteristics:
  - pH charts
  - refrigerating effect, relate back to air and fluid coolers
  - heat of compression, relate back to screw, rotary and reciprocating compressors
  - heat rejected high side of the system, relate back to air cooled, evaporative, and water-cooled condensers
  - variable liquid refrigeration systems and liquid oversee systems
  - required mass flow rate of refrigerant and volume flow rate at various points in system
  - theoretical compressor power
  - required condenser capacity
- major system components:
  - refrigerants, including R717 and R22
  - secondary refrigerants
  - component lubricant refrigerant compatibility
  - evaporators
  - condensers and cooling towers
  - compressors
  - expansion valves
  - interconnecting piping and
  - isolating valves
  - pilot-operated valves
  - defrost system components for air, water, recycled water, hot gas and electric methods
  - refrigerant accumulators and liquid pumps
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0026 Design mechanical ventilation/exhaust systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design mechanical ventilation/exhaust systems and select equipment.

It includes applying processes and methods of mechanical ventilation/exhaust systems, safety and relevant industry standards; developing alternative design schemes based on design brief and customer requirements; and documenting system designs.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0022 Design heating, ventilation and air conditioning (HVAC) systems and select components

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

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UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design mechanical ventilation/exhaust systems and select equipment	**1.1** WHS/OHS processes and procedures for a given work area are identified, obtained and applied

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		1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
		1.3 Scope of the proposed mechanical ventilation/exhaust system is determined from the design brief and/or consultations with relevant person/s
		1.4 Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2	**Design mechanical ventilation/exhaust systems and select equipment**	**2.1** Relevant mechanical ventilation/exhaust processes and methods are applied to the design
		2.2 Alternative concepts for design are evaluated in accordance with the design brief
		2.3 Safety, functionality and budgetary considerations are incorporated in the design specifications
		2.4 System design draft is checked for compliance in accordance with the design brief and relevant industry standards
		2.5 System design is documented for submission to relevant person/s for approval
		2.6 Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3	**Obtain approval for mechanical ventilation/exhaust systems design and equipment selection**	**3.1** System design is presented to customer and/or relevant person/s in accordance with workplace procedures
		3.2 Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
		3.3 Final design is documented and approval obtained from relevant person/s in accordance with workplace procedures
		3.4 Quality of work is monitored in accordance with workplace procedures and relevant industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

designing mechanical ventilation and exhaust systems must include at least the following:	• two different mechanical ventilation and exhaust systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ144A Design mechanical ventilation/exhaust systems and select equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0026 Design mechanical ventilation/exhaust systems and select equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety, regulatory, functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- designing mechanical ventilation/exhaust systems and select equipment
- preparing to design mechanical ventilation/exhaust systems and select equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- exhaust systems design, safe working practices and relevant standards, codes and regulations, including:
  - relevant codes and regulations:
    - health and safety
    - noise
    - smoke
    - fire
    - hazard identification
  - system types:
    - applications

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    - application flow charts
    - system requirements
    - hazard identification
    - effluent types and removal
    - relationship with smoke spill systems
    - supply air dilution applications
    - natural ventilation applications
    - fan assisted exhaust applications
    - replenishment of exhaust air
    - system components
  - duct design:
    - static, velocity and total pressure
    - pressure drop
    - fouling
    - transitions
    - elbows
    - fan position and mounting
    - noise and noise attenuation
    - requirements for access and maintenance
    - system integrity
  - fan and motor selection:
    - applications
    - suitable fan types
    - motor rating and suitability
    - balancing the fan duct system
    - flame proofing
  - filters and filter selection:
    - types and applications
    - capture velocity
  - outlet design and location:
    - prevailing winds
    - position relative to air intakes
    - weather and bird proofing
  - cycling/operation control:
    - applications
    - code/regulation requirements
    - monitoring of contaminants
    - contaminant detection
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes

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- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0027 Design secondary refrigerant systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design secondary refrigerant systems.

It includes designing secondary refrigerant systems based on a design brief and customer requirements, applying relevant industry standards, selecting components and documenting system design.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0016 Design commercial refrigeration systems and select components

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design secondary refrigerant system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the refrigeration system is determined from

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		design specifications and/or in consultation with relevant person/s
	1.3	Safety and system are identified, obtained and applied in accordance with relevant industry standards
	1.4	Work supervisor and/or customer/s are consulted to determine functions and parameters of the system required in accordance with design specifications and workplace documentation
	1.5	Design development work is planned in accordance with workplace procedures for timelines in consultation with others involved
2 Design secondary refrigerant systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant secondary refrigeration system analysis, components and piping are applied to developing the system design in accordance with workplace procedures and relevant industry standards
	2.3	Safety, functionality and budgetary considerations are incorporated in the installation specifications
	2.4	Equipment is selected in accordance with the design specifications and workplace procedures
	2.5	Location of components is documented in accordance workplace procedures and operation of system functions
	2.6	System design draft is checked in accordance with the design brief and relevant industry standards
	2.7	System design is documented for submission to relevant person/s for approval
	2.8	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
3 Obtain approval for engineering computer applications design	**3.1**	System design is presented to customer and/or relevant person/s in accordance with workplace procedures
	3.2	Requests for alterations to the design are negotiated with relevant person/s in accordance with workplace procedures
	3.3	Final design is documented and approval obtained from

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	relevant person/s in accordance with workplace procedures
3.4	Quality of work is monitored in accordance with workplace procedures and relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing secondary refrigeration systems must include at least the following:	• two of the following:
	  • two multi-stage cascade, or
	  • two liquid recirculation, or
	  • one multi-stage and one liquid recirculation
	• major components, including:
	  • heat exchanger
	  • condenser
	  • compressor
	  • accumulator
	  • pump
	• associated components and controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ183A Design secondary refrigerant systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0027 Design secondary refrigerant systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding required operating functions and parameters from the design specification
- developing the design within the safety, regulatory and functional requirements and budget limitations
- documenting and presenting design effectively
- negotiating design alteration requests successfully
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk controls
- designing secondary refrigeration systems
- preparing to design secondary refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- secondary refrigeration system design, components and piping design, safe working practices and relevant standards, codes and regulations, including:
  - technical standards, regulations and codes for secondary refrigeration systems:
    - environmental and safety considerations in the use and disposal of secondary refrigerants:
      - toxicity and food compatibility
      - flammability
      - environmental effects
      - safe disposal
      - safety data sheets (SDS)/material safety data sheet (MSDS) samples
      - registration requirements for transport and on-site use

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- secondary refrigeration systems design requirements:
  - applications of secondary refrigeration systems in refrigeration
  - introduction to secondary refrigeration
  - applications in industrial refrigeration: cold storage, food processing and climatic test chamber
  - application in commercial refrigeration: supermarkets and small commercial systems
  - advantages and disadvantages of secondary refrigerants over the direct use of primary refrigerants
- properties, application and limitations of available secondary refrigerants:
  - general classification of secondary refrigerant types – single phase, volatile and phase change
  - general types of single phase secondary refrigerants available: glycols, alcohols, brines, hydrocarbons, silicone oils and water
  - common types of volatile and phase change secondary refrigerants available: CO2 and ice slurries
  - thermal and transport properties of most widely used single phase secondary refrigerants (MEG, PG, ethyl alcohol, CaCl2, potassium brines)
  - pump selection for viscous fluids
- application concepts and principles:
  - main and loop circuits, use of variable speed pumps and overflow valves
  - buffer and storage tanks, benefits and disadvantages
  - loop temperature control and loop pump selection
  - control valve options: regulating and on/off, two-way and three-way, mixing and diverting
  - expansion and contraction of components, compensation for pipe expansion and effect of pipe pre-insulation
  - expansion and contraction of secondary refrigerant, use of membrane expansion tanks versus open expansion tank
  - air purging
- secondary refrigeration system components and piping:
  - corrosion and material selection:
    - materials compatibility table
    - thermal and other properties of materials in use
    - pipe material and jointing methods/materials
    - pumps, impellers and seals
    - isolation and control valves
    - heat exchangers
  - pipe and insulation materials:
    - metal pipe
    - plastic pipe

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        - post-installation insulation (in situ foaming, formed insulation and closed cell flexible insulation)
        - pre-insulated pipe material
        - vapour barrier – importance and maintenance
    - heat exchangers:
        - plate heat exchangers, brazed, welded, semi-welded and gasketed; design considerations in conjunction with primary refrigerant, flooded, direct expansion, and pump circulated primary refrigerant
        - shell and tube and plate and shell heat exchangers
        - fan coil units
    - system control:
        - primary pump speed and staging control
        - maintenance of minimum flow and control valve pressure head
        - overflow valves
        - secondary loop temperature control
        - room humidity and temperature control with fan-coil units
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace budget, quality, policies and procedures
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0028 Determine noise and vibration encountered in HVAC/R applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine noise and vibration encountered in heating, ventilation and air conditioning/refrigeration (HVAC/R) applications.

It includes measuring sound, noise and vibration encountered in HVAC/R systems. It also includes working safely, using problem-solving procedures, applying appropriate theorems and providing interpretations derived from measurements and calculations and justification for such interpretations.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

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UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare HVAC/R system to determine noise and vibration encountered in application	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 WHS/OHS risk control work preparation measures and workplace procedures are followed
	1.3 Nature of the problem is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of equipment and products required for HVAC/R work are established in accordance with workplace procedures

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	1.6	Tools, equipment and testing devices needed to carry out HVAC/R work are obtained and checked for correct operation and safety
2 Determine HVAC/R application noise and vibration measurements	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
	2.2	Need to test or measure active HVAC/R systems is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.3	HVAC/R systems are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Relevant technique or process methods are used to determine noise and vibration measurement encountered in HVAC/R application
	2.5	Unexpected situations are dealt with safely in accordance with workplace procedures and with the approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.6	Measurements are taken without damage to HVAC/R apparatus, circuits, the surrounding environment or services using sustainable energy practices with minimum waste and re-work
3 Document HVAC/R application noise and vibration measurements and calculations	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for alternative approach to determine noise and vibration measurements is documented and appropriate person/s notified in accordance with workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing sound, noise and vibration measurements must include at least the following:	• two HVAC/R applications

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ131A Determine noise and vibration encountered in HVAC/R applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0028 Determine noise and vibration encountered in HVAC/R applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying the dynamic characteristics of systems/materials and the effects due to different operating parameters
- using established measurement methods
- taking relevant measurements accurately
- interpreting measured values appropriately
- providing correct interpretation of data taken from measurements and calculations
- dealing with unplanned events
- applying problem solving procedures including using appropriate theorems
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- determining noise and vibration encountered in heating, ventilation and air conditioning/refrigeration (HVAC/R) applications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- noise and vibration fundamentals, safe working practices and relevant standards, codes and regulations, including:
  - fundamentals of sound:
    - properties of sound: wavelength, amplitude, frequency, period, velocity, sound (intensity, pressure and power) and decibels
    - sound pressure level
    - sound power level
    - addition of sound levels
    - loudness and weighting networks

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    - sound spectrum and octave bands
    - single value representation of sound spectrum
    - noise rating (NR) curves
    - sound meters
- fundamentals of vibration:
    - terminology: spring-mass system, spring in series and/or parallel, stiffness, effective stiffness, viscous frictional coefficient, mass, period, frequency (angular, natural, damped and forced), amplitude, static deflection, damping ratio, damping factor and frequency ratio
    - simple harmonic motion (SHM)
    - damped vibration
    - forced vibration
    - maximum amplitude and resonance
    - transmissibility and isolation efficiency
    - vibration isolators
- relevant HVAC/R manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant techniques, processes or measurement methods to obtain sound, noise and vibration data, including problem-solving procedures and appropriate theorems
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0029 Develop heat exchanger design specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop heat exchanger design specifications.

It includes working safely, applying refrigeration parameters, gathering and analysing data, and developing and documenting results and solutions for work/project and/or development records.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0004 Analyse vibration and noise in refrigeration and air conditioning systems

UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

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UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop specifications for exchanger designs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures are followed in preparation for the work
	1.3 Scope of analysis to develop specifications is determined from design brief, relevant reports and/or consultations with relevant person/s
	1.4 Activities are planned in accordance with workplace procedures for timelines in consultation with others involved in the work

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	1.5	Strategies are formed to ensure analysis is carried out in accordance with workplace procedures and relevant industry standards
2 Develop specifications for exchanger designs	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Relevant refrigeration parameters are applied to developing heat exchanger specifications in accordance with workplace procedures and relevant industry standards
	2.3	Parameters and performance requirements in relation to refrigeration systems are obtained in accordance with workplace procedures and relevant industry standards
	2.4	Refrigeration parameters are analysed to provide effective solutions in accordance with workplace procedures
	2.5	Unplanned events are dealt with in accordance with problem-solving techniques and workplace procedures
	2.6	Quality of work is monitored in accordance with workplace procedures and relevant industry standards
3 Document specifications for exchanger design	**3.1**	Analysis, findings, calculations and assumptions are documented in accordance with workplace procedures
	3.2	Specifications for heat exchanger are developed from analysis findings and in accordance with workplace procedures
	3.3	Developed specification and analysis is reported to relevant person/s for endorsement in accordance with workplace procedures
	3.4	Justification for findings and actions undertaken in relation to the design is documented in accordance with workplace procedures and relevant industry standards for work/project and/or development records

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing specifications for heat exchangers must include at least the following:

- two different designs

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ149A Develop heat exchanger design specifications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0029 Develop heat exchanger design specifications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- interpreting compliance documents
- setting up and conducting appropriate examinations and tests
- identifying non-compliance defects
- reporting examination and test results and non-compliance issues clearly and accurately
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- developing specifications for exchanger designs
- documenting specifications for exchanger designs
- identifying analysis, findings, calculations and assumptions
- preparing to develop specifications for exchanger designs
- reporting findings and actions.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- heat exchanger design, safe working practices and relevant standards, codes and regulations, including:
  - advanced thermodynamics:
    - heat transfer:
      - modes of heat transfer
      - conduction through a flat plate, series flat plates, thick and thin wall pipe, and composite pipes (e.g. lagged pipes and drums)
      - convection at a flat surface or tube
      - radiation from a flat surface or tube for black or grey bodies
      - combined conduction and convection through single or multiple flat plates or thin wall tubes

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        - combined convection and radiation
        - combined conduction, convection and radiation such as fluid in a tank (convection to wall), through wall and/or insulation
        - (conduction) to outside air (convection and radiation)
        - heat exchangers - parallel, counter flow and cross flow
    - refrigeration/heat pump:
        - basic principles and terminology
        - vapour compression cycle
        - performance criteria
        - types of refrigerant - designation, properties advantages and disadvantages
        - refrigerant properties using the pH diagram
        - ideal vapour compression cycle on the pH diagram
        - energy balance and heat transfers in compressor, evaporator and condenser
        - actual vapour compression cycle and variations from the ideal
        - pressure loss in lines and non-ideal compression
        - superheating and subcooling with or without suction/liquid heat exchanger
        - Carnot principle applied to refrigerator and heat pump
        - principles of evaporative refrigeration, absorption refrigeration, air cycle refrigeration and thermo-electric refrigeration
    - heater exchanger design:
        - concepts
        - design parameters and limitations
        - construction material and components
        - testing requirements
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0030 Develop specifications and prepare drawings for HVAC/R projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop specifications and prepare drawings for heating, ventilation and air conditioning/refrigeration (HVAC/R) system projects.

It includes working safely, following a design brief for HVAC/R systems, selecting system components, operating within established project budget, and developing project specifications and design drawings.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0061 Produce HVAC/R system design drawings

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

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UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop HVAC/R specifications and prepare drawings	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified and applied
	1.2 Extent of the project scope is determined from design brief and/or relevant documentation and from discussions with appropriate person/s
	1.3 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved in the work
	1.4 Information technology and software tools and equipment needed for the HVAC/R work are obtained in accordance with workplace procedures
2 Develop HVAC/R specifications and	**2.1** Sources of components and materials needed for the HVAC/R project are determined and selected for their

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	prepare drawings	availability, suitability for purpose and cost in accordance with workplace policies and procedures
		2.2 HVAC/R specifications are developed to include necessary performance requirements for components and system
		2.3 Risk management strategies for the HVAC/R project are sought and obtained for incorporating in the specification
		2.4 Appropriate information technology and software tools are used to develop HVAC/R specifications and produce drawings based on standard protocols
		2.5 HVAC/R project specifications and drawings are reviewed against project inputs and adjusted to rectify any anomalies
		2.6 HVAC/R project specifications and drawings are documented in accordance with workplace policies and procedures
		2.7 Solutions to unplanned situation are provided in accordance with workplace policies
		2.8 HVAC/R work quality is monitored against performance agreement and/or organisational or industry standards
3	**Obtain approval for HVAC/R specifications and drawings**	**3.1** HVAC/R project specifications and drawings are presented and discussed with relevant person/s
		3.2 Alterations to the project specifications and drawings resulting from the presentation/discussion are negotiated with relevant person/s in accordance with organisation policies
		3.3 Final HVAC/R project specifications and drawings are documented and approval obtained from appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing HVAC/R specifications and preparing drawings must include at least the following:

- two different HVAC/R projects

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ139A Develop specifications and prepare drawings for HVAC/Refrigeration projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0030 Develop specifications and prepare drawings for HVAC/R projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the project requirements accurately
- establishing source and availability of components appropriately, including the performance requirements of components and the system and risk management strategies in the specifications
- negotiating alterations to the project specifications and drawings successfully
- documenting project specifications and drawings in accordance with organisation policies and procedures
- obtaining approval for the completed project specifications and drawings
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- developing specifications and preparing drawings for heating, ventilation and air conditioning/refrigeration (HVAC/R) system projects, including:
- using appropriate information technology in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- specification development - specification writing; safe working practices and relevant standards, codes and regulations, including:
  - purpose and nature of specification
  - performance based specifications
  - prescriptive specifications
  - acceptable evidence of compliance
  - additional service required with the supply of equipment

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- dealing with suppliers and manufacturer's
- documenting specification

- computer-aided drafting (CAD):
  - specific procedures:
    - creating symbols for library files
    - program specific commands
    - speed enhancement
    - configuring the digitising tablet
  - methodology for creating layers:
    - name
    - colour
    - line type
  - methodology for drawing variables:
    - limits
    - grid
    - snap
    - dimensions
    - text
    - units
  - ISO drawing sheets
  - advanced drawings
  - multiple three-dimensional views:
    - setting up environment on screen
    - top view
    - front and side views
    - three-dimensional views
  - movement through space:
    - draw on any created views
    - relocate coordinate system as necessary
  - creation of views:
    - creation of three-dimensional geometric shapes
    - creation of three-dimensional complex view by:
      - manipulation of drawing planes
      - location of geometric shapes
  - editing:
    - use of function to facilitate modification of geometric shapes in completion of a three-dimensional view
  - display of three-dimensional view:
    - wire line
    - solid face

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    - isometric
    - perspective
    - orthographic:
  - saving:
    - use of assembly drawing file for plotting
- design brief requirements
- information technology
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and information technology currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults and replace faulty components in refrigeration and air conditioning control systems, interconnecting circuits and equipment operating at voltages up to 1000 volt (V) alternating current (a.c.).

Competency in this unit requires the ability to work safely, diagnose faults, apply fault-finding procedures, conduct repairs, replace components and complete required service documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the commissioning and repair of refrigeration and air conditioning system.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit may require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Details of the air conditioning or refrigeration system fault are obtained from documentation, client and/or from supervisor to establish scope of work to be completed
	1.3 Advice is sought from supervisor, as required, to ensure work is coordinated with others
	1.4 Sources of materials required for work are accessed in accordance with workplace procedures
	1.5 Tools, equipment and testing devices are obtained in accordance with workplace procedures and checked for operational safety
2 Diagnose faults	**2.1** Need to test or measure live electrical work on an operating system is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Circuits/machines and/plant are checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.3 Fault finding, using measured and calculated values of system and component parameters, is undertaken methodically in accordance with workplace procedures
	2.4 Faults, beyond the scope of refrigeration and air conditioning system work, are identified and reported in

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		accordance with workplace procedures
	2.5	Control system components are dismantled, where necessary, and parts safely stored to protect them against loss or damage in accordance with workplace procedures
	2.6	Faulty components are rechecked and fault status is confirmed
	2.7	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.8	Fault-finding activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Repair faults	**3.1**	Arrangements are made in accordance with workplace procedures for authorised person/s to rectify faults that are beyond the scope of refrigeration and air conditioning work
	3.2	Equipment is checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	3.3	Materials required are obtained in accordance with workplace procedures
	3.4	Repairs are completed without damage to other components or apparatus using sustainable energy principles in accordance with workplace procedures
	3.5	Effectiveness of repair work is tested in accordance with workplace procedures
	3.6	Air conditioning and refrigeration control system is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
4 Complete and report fault-finding and rectification activities	**4.1**	Work area is cleaned and made safe in accordance with workplace procedures
	4.2	Report is completed in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in air conditioning and refrigeration control systems must include at least the following:	• two refrigeration and/or air conditioning control system
	• four faults:
	  • open circuit
	  • short circuit
	  • incorrect connections
	  • insulation failure
	  • unsafe condition
	  • control apparatus/component failure
	  • related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ170A Diagnose and rectify faults in air conditioning and refrigeration control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - using risk control measures
- completing and reporting fault-finding and rectification activities
- diagnosing and rectifying faults in refrigeration and air conditioning control systems, including:
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - finding at least four faults
  - providing report for rectifications undertaken
  - rectifying faults without damage
  - using approved methodical fault-finding techniques
- implementing legislation, industry standards, codes of practice and regulations
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- diagnose and rectify faults in refrigeration and air conditioning control systems, including:
  - control systems and components
  - method and procedures of finding, rectifying and recording control system faults
  - refrigeration and air conditioning direct digital control applications and basic operation
  - refrigeration and air conditioning electrical/electronic control types, applications, operation, installation/replacement, setting, adjustment and testing

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  - refrigeration and air conditioning pneumatic control applications and basic operation
  - refrigeration and air conditioning process characteristics and control parameters
  - system responses to parameter changes
- refrigeration and air conditioning direct digital control applications and basic operation
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - potential hazards
  - risk control measures
  - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- WiFi/router controls for variable air volume (VAV) and remote access controls for refrigeration and air conditioning.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in complex air conditioning/refrigeration systems.

It includes working safely, interpreting technical data and applying knowledge of complex refrigeration/air conditioning system operating parameters to logical fault-finding processes. It also includes implementing fault rectification, safety and functional testing, and completing and reporting fault diagnosis and rectification activities and outcomes.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** WHS/OHS requirements and procedures are identified, obtained and implemented

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	1.2	WHS/OHS risk control measures and procedures are followed in preparation for work
	1.3	Hazards are monitored and any not previously identified are documented and risk control measures implemented in consultation with relevant person/s
	1.4	The extent of faults are determined from reports/documentation and discussions with relevant person/s
	1.5	Relevant person/s is consulted to ensure work is coordinated with others on the worksite
	1.6	Tools, equipment and testing devices required to diagnose faults are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Diagnose and rectify faults	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.3	Circuits/machines/plant are checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.4	Logical diagnostic methods, measurements and estimations are applied to diagnose complex refrigeration/air conditioning system faults in accordance with system operational parameters and requirements
	2.5	Suspected fault sources are tested to confirm if they are the source of system problems
	2.6	Fault causes are identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the refrigeration and air conditioning system
	2.7	Faults in system components are rectified to return refrigeration/air conditioning system to its operational standard
	2.8	System is tested to verify that the system operates as

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		intended and to specified requirements and industry standards
	2.9	Methods for resolving unexpected situations are discussed, as required, with appropriate person/s in accordance with job specifications and requirements
	2.10	Methods for resolving unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are conducted without waste of materials, damage to apparatus, the surrounding environment and/or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Fault diagnosis and rectification activities are documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified that system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults must include at least four faults in the following complex refrigeration/air conditioning systems:	• multiple major components (i.e. compressors, condenser or evaporators) • circuits or systems and associated components and controls

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ112A Diagnose and rectify faults in complex air conditioning/refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the cause of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system controls
- verifying that the system operates correctly
- dealing with unplanned events
- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing and reporting fault diagnosis and rectification activities
- determining need to test or measure live work
- isolating circuits/machines/plant
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex refrigeration and air conditioning system fault finding and repair, safe working practices and relevant standards, codes and regulations, including:
  - fault-finding techniques including:
    - factors to consider in clarifying the nature of a fault:
      - initial fault report

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    - confirmation of symptoms of the fault
    - comparison of symptoms with normal operation
- effect to cause reasoning — assumptions of possible causes
- methods for testing assumptions encompassing:
  - visual inspection
  - sectional testing
  - split-half tests
  - component isolation
- dealing with intermittent faults
- causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference
- refrigeration system analysis, including:
  - pressure enthalpy definitions:
    - high pressure and low-pressure refrigerants
    - triple point of new refrigerants
    - glide of trinary blends
    - differential evaporation of refrigerant blends
    - variable refrigerant volume
- refrigeration cycle, including:
  - expansion process
  - vaporising process
  - compression process
  - condensing process
  - compression ratio
- enthalpy processes, including:
  - co-efficient of performance
  - effect of suction temperature on cycle efficiency
  - effect of condensing temperature on cycle efficiency
- actual refrigerating cycles, including:
  - design operating conditions
  - effects of superheating suction vapour
  - superheating without useful cooling
  - superheating that produces useful cooling
  - superheating in suction piping outside the refrigerated space
  - superheating the vapour inside the refrigerated space
  - effects of subcooling the liquid
  - effects liquid - suction heat exchangers
  - effects of pressure losses resulting from friction
- refrigeration cycle faults, including:
  - symptoms and causes

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        - measurements and fault confirmation tests
- air conditioning system analysis, including:
    - psychrometric chart, including:
        - properties, definitions and units
        - plotting conditions:
            - RA, SA, OA and MA
    - psychometric processes, including:
        - heating
        - cooling only
        - cooling and dehumidification
        - cooling, dehumidification and reheat
    - design operating conditions, including:
        - indoor and outdoor wet and dry bulb temperatures
        - volume flow rate supply, return and outdoor air
    - air conditioning system faults, including:
        - symptoms and causes
        - measurements and fault confirmation tests
    - power and control system analysis, including:
        - power and control circuit diagrams
        - sequence of operation
        - manufacturers diagrams, specifications and instructions
        - power and control circuit faults:
            - symptoms and causes
            - measurements and fault confirmation tests
    - relevant measurements and estimations
    - relevant risk mitigation processes
    - relevant WHS/OHS legislated requirements, including:
        - environmental and sustainable energy principles and practices
        - safe working practices
    - relevant workplace policies and procedures
    - relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0033 Diagnose faults in complex HVAC/refrigeration control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in complex heating, ventilation and air conditioning (HVAC) or refrigeration control systems.

It includes applying safe working practices, interpreting technical data and applying knowledge of complex refrigeration or HVAC control system operating parameters to logical fault-finding processes. It also includes implementing fault rectification, safety and functional testing; and completing and reporting fault diagnosis and rectification activities and outcomes.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

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UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0032 Diagnose and rectify faults in complex air conditioning/refrigeration systems

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** WHS/OHS requirements and workplace procedures are identified, obtained and applied
	1.2 WHS/OHS risk control measures and procedures are followed
	1.3 Hazards not previously identified are documented and risk control measures devised and implemented in consultation with relevant person/s

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	1.4	Extent of faults are determined from reports/documentation and/or discussions with relevant person/s
	1.5	Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.6	Tools, equipment and testing devices required to diagnose faults are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Diagnose and rectify faults	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test and measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.3	Circuits/machines/plant are checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.4	Logical diagnostic methods, measurements and estimations are applied to diagnose control system faults in accordance with system operating parameters and operational requirements
	2.5	Suspected fault sources are tested to confirm source of system problems
	2.6	Fault causes are identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in system components are rectified to return the refrigeration or HVAC system to its operational standard
	2.8	System is tested to verify that the system operates as intended and to specified requirements and operational standards
	2.9	Methods for resolving unplanned events are discussed with appropriate person/s in accordance with job specifications and requirements
	2.10	Methods for resolving unplanned situations are selected

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		on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are conducted without waste of materials, damage to apparatus, the surrounding environment and/or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Fault diagnosis and rectification activities are documented in accordance with workplace procedures
	3.4	Appropriate person/s is notified that system faults have been rectified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Diagnosing and rectifying faults in complex HVAC and refrigeration control systems must include at least the following:

- four faults in complex refrigeration or HVAC control systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ122A Diagnose faults in complex HVAC /refrigeration control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0033 Diagnose faults in complex HVAC/refrigeration control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying logical diagnostic methods
- using fault scenarios to test the cause of system faults
- identifying faults and competency needed to rectify them
- rectifying faults in system controls
- verifying that the system operates correctly
- documenting fault rectification
- dealing with unplanned events
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- determining need to test or measure live work
- diagnosing faults in complex refrigeration or heating, ventilation and air conditioning (HVAC) control systems
- isolating circuits/machines/plant
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- complex HVAC/refrigeration control systems, fault finding, safe working practices and relevant standards, codes and regulations, including:
  - control fundamentals, including:
    - control terminology

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- refrigeration system characteristics
- HVAC system characteristics
- control system characteristics
- control system components
- control system diagrams and symbols
- product knowledge

- types of control equipment, including:
  - electrical:
    - classification of circuits
    - two position control
    - floating control
    - sensors
    - controllers
    - flow control devices
    - control systems diagrams
  - electronic:
    - operating principles
    - sensors
    - controllers
    - control system diagrams
- digital control systems, including:
  - computer-based control fundamentals:
    - definitions
    - principles
  - controller configuration:
    - equipment
    - zone level controllers
    - system level controllers
  - controller software:
    - operating software
    - application software
  - controller programming:
    - system diagrams
    - control diagrams
    - configuration
    - programming
    - initialisation
    - EMS and BMS
    - supervisory control and data acquisition (SCADA) system

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        - lan and Bacnet
- control systems applications, including:
    - refrigeration
    - air conditioning:
        - air handling system controls
        - ventilation
        - heating
        - building airflow system control
        - airflow control
        - singles and multi-zones
        - chiller/boiler and distribution system control (chilled water, boiler and distribution systems)
- diagnostic methods, measurements and estimations
- faults within scope of work
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements, including:
    - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to establish heat loads for commercial refrigeration and/or air conditioning applications.

It includes determining heat loads for commercial refrigeration and air conditioning applications using quick selection, short-form paper and computer-based methods and documenting results.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

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UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to determine heat loads for commercial refrigeration and/or air conditioning applications	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for commercial refrigeration/air conditioning work
	1.3 Extent of heat load analysis is determined from project specifications and discussions with appropriate person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with other person/s involved in commercial refrigeration/air conditioning work
	1.5 Effective strategies are determined to ensure solution

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		development and implementation is carried out efficiently in accordance with workplace procedures
2	**Determine heat loads for commercial refrigeration and/or air conditioning applications**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out commercial refrigeration/air conditioning work is followed
		2.2 Specifications of commercial refrigeration and/or air conditioning system operating parameters are applied when performing heat load estimations
		2.3 Parameters, specifications and performance requirements in relation to commercial refrigeration and/or air conditioning system are set in accordance with workplace procedures
		2.4 Appropriate approaches to determine the heat loads are carried out to provide most effective solutions
		2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and workplace procedures in a manner that minimises risk to personnel and equipment
		2.6 Work quality is monitored in accordance with performance agreement and/or workplace or industry standards
3	**Complete and report heat loads for commercial refrigeration and /or air conditioning applications**	**3.1** Heat load estimations are documented, including details of findings, calculations and assumptions, in accordance with workplace procedures
		3.2 Completed heat loads are submitted to appropriate person/s to be checked for accuracy and compliance with project specifications and evaluated to determine whether performance requirements are met
		3.3 Heat load estimations are reported to relevant person/s to determine appropriate action to be taken based on findings

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining heat loads for commercial refrigeration and/or air conditioning applications must include at least the following:

- one quick selection short-form paper and/or one computer-based method for a refrigeration and/or air conditioning system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ129A Establish heat loads for commercial refrigeration and/or air conditioning applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing system parameters for heat load
- selecting appropriate head load calculation tools
- identifying heat loads accurately
- using calculation methods accurately
- documenting heat loads correctly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices requirements, including using risk control measures
- applying sustainable energy principles and practices
- determining heat loads for commercial refrigeration and air conditioning applications
- planning to determine heat loads for commercial refrigeration/air conditioning applications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial refrigeration heat load estimating commercial refrigeration applications, safe working practices and relevant standards, codes and regulations, including:
  - heat transfer:
    - factors affecting heat transfer
    - insulation material characteristics
    - vapour barriers (seals)
    - ambient conditions
    - composite walls (heat flows)
    - types of common insulation

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    - thermal conductivity
    - film factors
- cabinet construction and design:
    - deep freeze case
    - meat case
    - dairy case
    - fruit and vegetable case
    - drink cabinets
- air change load:
    - room volumes
    - room usage (average, medium and heavy)
    - heat removed from cooling air to refrigerated conditions
    - air curtains
    - temperature differences
    - door opening sizes
    - Tamm's equation
- product load:
    - sensible heat
    - latent heat
    - heat of respiration
    - storage temperatures
    - unit running times
    - humidity
    - air flows
    - stacking of products
    - freeze, chill and thaw times
- total freezer/cool room loads:
    - wall load
    - air change load
    - product load
    - miscellaneous
    - total load, safety factor and unit running times
    - floor loads in cool rooms
    - door opening loads (ASHRAE and RADS methods)
    - door opening loads (for trucks)
- process cooling loads
    - cooling chemical reactions
    - energy balance methods
    - sensible and latent cooling of gases

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    - sensible and latent cooling of water vapour in gas streams
  - computer programs
  - commercial air conditioning heat load estimating
- heat load estimating for commercial air conditioning applications, safe working practices and relevant standards, codes and regulations, including:
  - heat flow in buildings:
    - conduction
    - convection
    - radiation
    - heat paths
  - thermal storage
  - different methods of calculations:
    - ASHRAE
    - carrier
    - finite difference
  - U values
  - film coefficients
  - solar heat:
    - direct
    - diffuse
    - sol air temperature
    - sun position calculations
  - design conditions:
    - outdoor
    - monthly/daily corrections
    - comfort/critical
    - indoor
    - effective temperature
  - thermal comfort
  - space characteristics
  - equipment location
  - zoning
  - internal loads:
    - lighting
    - equipment
    - people
    - load profiles
    - internal partitions
  - fresh air/AS 1668 The use of ventilation and air conditioning in buildings
  - calculation of fabric loads:

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    - walls
    - roofs
    - floors
- windows:
    - glass types and factors
    - shade factors
    - internal and external shading
    - shading from adjacent structures
- air quantity calculation:
    - psychrometrics
    - by-pass factor
    - coil load
    - variable air volume (VAV) air quantities
- piping and other losses
- refrigeration plant load
- computer software:
    - responsible use
- relevant commercial refrigeration and air conditioning manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0035 Establish the basic operating conditions of air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine operating conditions of air conditioning systems.

It includes working safely; determining air temperature, air flow rates and relative humidity using measurement and calculation methods.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the commissioning, service and repair of air conditioning systems.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to determine operating conditions of air conditioning system**	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
		1.2 Safety hazards which have not previously been identified are assessed, reported and advice on risk control measures is sought from supervisor
		1.3 System design operating conditions are obtained from documentation or supervisor to determine scope of work to be undertaken
		1.4 Advice is sought from the supervisor to ensure work is coordinated effectively with others
		1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
		1.6 Tools, equipment and testing devices needed to determine operating conditions are obtained and checked for correct operation and safety in accordance with workplace procedures
2	**Determine operating conditions of air conditioning system**	**2.1** Measuring system operating parameters are implemented in accordance with job requirements and workplace safety procedures
		2.2 Air conditioning system is checked and isolated in accordance with workplace procedures
		2.3 Actual and specified range of operating conditions are determined from measured and calculated values as they apply to air conditioning system in accordance with workplace procedures
		2.4 Methods for dealing with unplanned situations/events are discussed with appropriate person/s and documented
		2.5 Unexpected situations are dealt with safely and with the approval of relevant person/s
		2.6 Operating conditions for air conditioning system are determined without damage to apparatus, circuits, the surrounding environment or services using relevant workplace sustainable energy practices in accordance with workplace procedures
3	**Complete work and report**	**3.1** Worksite and equipment are cleaned and made safe in accordance with workplace procedures

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3.2 Operating conditions are documented, including identification of any parameter that is not within the specified range for the of air conditioning system, in accordance with workplace procedures

3.3 Supervisor is notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining operating conditions of air conditioning system must include at least the following:	• using measurement and calculation methods of air side components of air conditioning systems, including:
	  • air dry and wet bulb temperatures
	  • air velocity
	  • relative humidity
	  • volume flow rates across a grille/register

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ104A Establish the basic operating conditions of air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0035 Establish the basic operating conditions of air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying safe working practices and relevant industry standards, codes of practice and regulations
- applying sustainable energy principles and practices
- completing work documentation and reporting requirements
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining the basic operating conditions of an air conditioning systems, including the air dry and wet bulb temperatures, relative humidity, air velocity and volume flow rates across a grille/register and documenting operating conditions
- identifying operating parameters not within specified range of the air conditioning system
- interpreting measurements
- selecting and using appropriate measuring devices
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating condition of air conditioning system, including:
  - air conditioning industry classifications, applications and common types of systems
  - air conditioning processes
  - air velocity, units of measurement, measuring devices (anemometer only), applications and taking readings
  - air volume flow rate and its units of measurement
  - basic air conditioning heat loads and check figures

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  - factors effecting human comfort and the comfort zone
  - hazards and risk control measures
  - psychrometrics, composition of air and basic psychrometric chart properties and plotting points
  - risk management principles, processes and safe working practices
  - safety data sheets (SDS)/material safety data sheets (MSDS)
  - sustainable energy principles and practices
  - temperature and relative humidity, scales, measuring devices and taking readings
  - ventilation needs, methods and applications
  - volume flow rate calculations
- relevant industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant manufacturer specifications
- relevant risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0036 Establish the basic operating conditions of vapour compression systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to determine operating conditions of vapour compression system.

It includes working safely; determining refrigerant pressures and temperatures, and relevant air and water temperatures using measurement and calculation methods. It also includes working with the three states of matter at each point in the refrigeration cycle (liquid, vapour and liquid-vapour mixture).

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the commissioning, service and repair of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to determine operating condition of vapour compression system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards which have not previously been identified are assessed, reported and advice on risk control measures is sought from supervisor
	1.3 System design operating conditions are obtained from documentation or supervisor to determine scope of work to be undertaken
	1.4 Advice is sought from the supervisor to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to determine operating conditions are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Determine operating condition of vapour compression system	**2.1** System operating conditions, including refrigerant pressures and temperatures and ambient temperatures, are measured in accordance with job requirements and workplace safety procedures
	2.2 Compression system is checked and isolated in accordance with workplace procedures
	2.3 Actual and specified range of operating conditions are determined from measured and calculated values as they apply to vapour compression system in accordance with workplace procedures

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	2.4	Methods for dealing with unplanned situations/events are discussed with appropriate person/s and documented
	2.5	Unplanned events are dealt with safely and with the approval of a relevant person/s
	2.6	Operating conditions for vapour compression system are determined without damage to apparatus, circuits, the surrounding environment or services using relevant workplace sustainable energy practices in accordance with workplace procedures
3 Complete work and report	**3.1**	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.2	Operating conditions are documented, including identification of any parameter that is not within the specified range for the vapour compression system, in accordance with workplace procedures
	3.3	Supervisor is notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining operating conditions of vapour compression system must include at least the following:	• measurement and basic calculation methods of vapour compression system whether used for refrigeration or air conditioning • suction and discharge pressures • ambient, evaporator and condensing temperatures • evaporator and condenser temperature difference

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ103A Establish the basic operating conditions of vapour compression systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0036 Establish the basic operating conditions of vapour compression systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying safe working practices and relevant industry standards, codes of practice and regulations
- applying sustainable energy principles and practices
- completing documentation and reporting requirements
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining operating conditions of vapour compression system
- documenting operating conditions
- identifying conditions of a refrigerant at various locations in the vapour compression system
- measuring and calculating actual and specified range of operating condition values, including recording measurements
- selecting and using appropriate measuring devices correctly
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating condition of vapour compression systems, including:
  - basic vapour compression systems operation and major components
  - common refrigerant metering devices, including capillary tube, thermostatic expansion (TX) valve, electronic expansion valve, function, types and applications
  - condenser function, types and applications
  - cooling tower function, types and applications
  - evaporator function, types and applications

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- hazards and risk control measures
- heat and heat transfer
- liquid receiver function, types and applications
- pressure, scales and measurement devices
- refrigerant conditions, including saturation, superheat, sub-cooling and pressure/temperature relationships
- refrigerant leak detector types, applications, hazards and safe working practices, care and maintenance, and leak detection procedures
- refrigeration compressor function, types and applications
- refrigeration compressor oil function, types and applications
- risk management principles and processes
- safe handling techniques, including safety data sheets (SDS)/material safety data sheets (MSDS)
- sensible and latent heat
- service gauge manifold hose fitting, purging, pressure reading and removal
- service gauge types, applications, care and maintenance, reading and calibration
- sustainable energy principles and practices
- system access fittings types, care, maintenance and connection
- temperature and relative humidity, scales and measurement devices
- vapour compression system operating conditions and pressure, temperature, state and enthalpy graphs
- vapour compression system symbols/diagrams, design ambient and storage/space conditions

- working safely with refrigeration vapour compression system relevant industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant manufacturer specifications
- relevant risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0037 Establish the basic operating conditions of vapour compression systems - appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to establish the operating condition of a vapour compression system in a self-contained refrigerated appliance.

Competency in this unit requires the ability to work safely; prepare for and establish operational conditions of vapour compression systems, including determining refrigerant pressures and relevant air temperatures using measurement and calculation methods; as well as completing all required documentation.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit may require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to determine operating conditions of vapour compression system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards, which have not previously been identified are reported in accordance with workplace procedures, and advice on risk control measures is sought from supervisor
	1.3 Details on work are obtained from documentation and/or from supervisor to establish the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated with others
	1.5 Sources of materials required for work are identified and accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices to establish the operating conditions of appliance's vapour compression system are obtained and checked for operational safety
2 Determine operating condition of a vapour compression system	**2.1** Measuring systems operating parameters are used in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance vapour compression system is checked and isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.3 Actual and specified range of operating conditions of vapour compression system is established from measured and calculated values in accordance with workplace procedures
	2.4 Unplanned situations are responded to in accordance with workplace procedures and discussed with relevant person/supervisor in a manner that minimises risk to personnel and equipment

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	2.5	Operating conditions of vapour compression system are determined without damage to appliance, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete work and report activities	**3.1**	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.2	Operating condition of a vapour compression system is documented in accordance with workplace procedures, including identification of any parameter that is not within the specified range for the system
	3.3	Supervisor is notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining operating conditions of a vapour compression system must include the following:	• suction and discharge pressures • ambient, evaporator and condensing temperatures • evaporator and condenser temperature difference

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ195A Establish the basic operating conditions of vapour compression systems - appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0037 Establish the basic operating conditions of vapour compression systems - appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying legislation, industry standards, codes of practice and regulations
- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - applying risk control measures
  - identifying hazards
  - implementing safe working practices
- completing work and reporting requirements
- determining operating conditions of appliance vapour compression systems, including:
  - selecting and using appropriate measuring devices
  - recording measurements
  - using calculation methods
  - identifying conditions of refrigerant at various locations in appliance vapour compression system
  - documenting operating conditions
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- using manufacturer specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- operating conditions of vapour compression systems used in refrigerated appliances, including:
  - domestic refrigeration
  - vapour compression system

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  - heat
  - temperature and relative humidity
  - sensible and latent heat
  - pressure
  - refrigerant conditions
  - vapour compression cycle
  - leak detectors
  - service gauges
  - refrigeration compressors
  - condensers and related components
  - evaporators and related components
  - common refrigerant metering devices
  - basic operating conditions
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - safe working practices
  - potential hazards
  - risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to establish the thermodynamic parameters of refrigeration and air conditioning system.

It includes determining thermodynamic parameters of refrigeration and air conditioning system using measurement and calculation methods and documenting results.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set

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procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to determine thermodynamic parameters of refrigeration and air conditioning system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for refrigeration and air conditioning system work
	1.3 Refrigeration and air conditioning system operating conditions are obtained from documentation or work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from the work supervisor to ensure refrigeration and air conditioning system work is coordinated effectively with others
	1.5 Tools, equipment and testing devices needed to determine the refrigeration and air conditioning system operating conditions are obtained and checked for

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			correct operation and safety
2	**Determine thermodynamic parameters of refrigeration and air conditioning system**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out refrigeration and air conditioning system work are followed
		2.2	Measurement of thermodynamic system operating parameters is conducted in accordance with WHS/OHS requirements and workplace safety procedures
		2.3	System is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	Actual and specified range of thermodynamic parameters are determined from measured and calculated values as they apply to refrigeration or air conditioning system in accordance to workplace procedures
		2.5	Unexpected situations are discussed with appropriate person/s, responded to in accordance with workplace procedures and documented in a manner that minimises risk to personnel and equipment
		2.6	Thermodynamic parameters are determined without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3	**Document thermodynamic parameters**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
		3.3	Thermodynamic parameters are documented, including identification of any parameter that is not within the specified range for the refrigeration and air conditioning system
		3.4	Work supervisor is notified of work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Determining thermodynamic parameters of refrigeration and air conditioning systems must include at least the following:	• using measurement and calculation methods of a refrigeration or air conditioning system, including:
	  • temperature
	  • pressure
	  • relative humidity
	  • enthalpy

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ127A Establish the thermodynamic parameters of refrigeration and air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- selecting and using appropriate measuring devices correctly
- interpreting measurements
- using calculation methods accurately
- identifying parameters not within the specified range
- documenting thermodynamic parameters correctly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) workplace procedures requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- planning to determine thermodynamic parameters of refrigeration and air conditioning system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- thermodynamic parameters of refrigeration and air conditioning systems, engineering mathematics fundamentals and refrigeration science, including:
  - arithmetic:
    - rational and irrational numbers, surds
    - International System of Units (SI) units and conversion using unity brackets
    - laws of indices (base 10), scientific and engineering notation
    - estimations, errors and approximations, and significant figures
  - algebra:
    - substitution

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  - +, -, x on simple polynomials and simple indices
  - expanding brackets
  - factorising quadratics, common factors and difference of two squares
  - simplifying algebraic fractions
  - transposition of engineering formulae
  - solving one variable equations
  - simple algebraic division
- geometry:
  - Pythagoras Theorem
  - angles: degrees, radians and parallel lines cut by a transverse
  - triangles: sum of angles, and properties of equilateral and isosceles triangles
  - congruent triangles
  - similar triangles: ratio of corresponding sides
  - sin, cos, tan: ratios of a right-angled triangle
  - sine and cosine rules
  - circles: circumference, arcs, chords, tangents and circle theorems
  - area and perimeter mensuration on above figures
- coordinate geometry:
  - 2-D plane; x-y axes and s-t axes
  - graph of linear function, $y = ax + b$ and functional notation, $y = f(x)$
  - straight line given slope and one point or given two points
  - linear equations: solving algebraically and geometrically
  - solving two linear functions simultaneously, algebraically and geometrically
  - line segment: length and mid-point
- engineering mechanics:
  - mass/density
  - weight
  - forces
  - specific gravity
  - equilibrium
  - momentum
  - friction loss
  - velocity and speed
  - energy in all forms
  - mechanical advantage
  - efficiency
  - pressure/stress
- molecular theory:
  - changes of state

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    - sublimation
    - expansion and contraction
    - electron flow
    - state of aggregation
    - internal potential energy
    - phase change diagrams
- thermodynamics:
    - temperature scales
    - conservation of energy
    - specific heat
    - sensible, latent and super heat
    - properties of steam
    - enthalpy
    - heat energy/temperature relationship
    - heat balance on a body
    - heat transfer
    - conductivity
    - calorimetry
    - peltier effect
    - 1st and 2nd law of thermodynamics
- gas laws and liquids:
    - pressure
    - Boyles law
    - Charles law
    - volumetric relationship
    - psychrometrics
    - latent heat of vaporisation
    - relative humidity
    - air conditioning processes
    - dynamic pressure loss
    - velocity and static pressure
    - bourdon tubes
    - density and relative density
    - Archimedes principle
    - Bernoulli’s equation
    - manometers
    - absorption refrigeration
    - centrifugal compression
    - external work of a liquid

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    - pressure volume diagrams
    - isothermal and adiabatic processes
    - polytropic processes
    - Dalton's law of partial pressure
- vapour compression:
    - pressure/enthalpy relationship
    - entropy
    - characteristics of evaporation and condensation
    - compression and pressure drop phases
    - co-efficient of performance
    - theoretical/practical cycles
    - characteristics of refrigerants
    - theoretical power input
    - pressure losses
    - heat exchange
    - effects of condensing condition changes
    - sub-cooling and superheating
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0039 Evaluate and report on building services energy management systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and report on building services energy management systems, plant and machinery.

It includes working safely, setting up and conducting evaluation measurements, evaluating energy use from measured parameters, and reporting results, including recommending any resulting corrective actions.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

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UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate and report on energy management	**1.1** WHS/OHS procedures are obtained and implemented in accordance with workplace procedures
	1.2 WHS/OHS risk control measures and procedures for work are followed
	1.3 The extent of evaluation is determined from building services, plant and machinery specifications and discussed with relevant person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others

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	1.5	Tools, testing devices and materials required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Evaluate energy management	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.3	Energy management of building services, plant and machinery is applied to the evaluation process
	2.4	Energy evaluation tests for each parameter under scrutiny are conducted in accordance with workplace procedures and test methods
	2.5	Energy evaluation tests are conducted methodically and results/comments systematically noted
	2.6	Unplanned situations are dealt with safely with the approval of authorised person/s
	2.7	Evaluation is conducted without damage to systems, circuits, the surrounding environment and/or services using sustainable energy practices
3 Report on energy management	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Results of energy management evaluation, including recommendations and justification for improvements, are documented
	3.4	Energy evaluation report is forwarded to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and reporting on building services energy management systems must include at least the following	• two different types of building services, plant and machinery

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ136A Evaluate and report on building services energy management systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0039 Evaluate and report on building services energy management systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent of the evaluation
- setting up and conducting appropriate examinations and tests
- reporting evaluation, including recommendation for improving energy efficiency
- dealing with unplanned events
- applying environmental and sustainable energy principles and practices
- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- determining need to test or measure live work
- implementing energy management procedures for a building
- performing energy evaluation tests
- preparing to evaluate and report on energy management.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- energy management fundamentals, safe working practices and relevant standards, codes and regulations, including:
  - typical energy sources and characteristics:
    - supply authorities
    - standard units of measurement
    - electricity

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    - steam
    - hot water
    - high temperature hot water
    - town gas
    - liquefied petroleum gas (LPG)
    - solar
    - waste heat
    - petrol
    - diesel
- energy usage:
    - office lighting
    - air conditioning systems
    - refrigeration systems
    - security systems
    - computer systems
    - standby/emergency systems
    - lifts and escalators
- energy auditing process:
    - energy costs and tariffs
    - energy consumption
    - predicting future costs
    - plotting consumption trends
    - historical data
    - collecting information using surveys
    - comparisons of actual to recorded usage
    - energy balance
    - instrumentation
    - building management systems
    - estimating savings potential
- system operation for energy efficiency:
    - types of systems
    - efficiency in building structures
    - operation of a vehicle fleet
    - proportion total energy consumption against individual systems
    - passive building design
    - preventative maintenance procedures
    - monitoring building management systems
    - operation of major and minor plant
    - inappropriate energy management procedures

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    - building plant control systems
    - Australian Standards/local authority requirements
    - case studies
  - implementing energy management procedures for a building:
    - recording base year data
    - climatic conditions for locality
    - establishing energy costs and tariffs
    - building and systems surveys
    - payback period
    - survey analysis
    - energy conservation procedures
    - informing stockholders
    - recommendations and documentation
    - implementation issues
    - monitoring, evaluation and follow up
  - building management systems
- building management systems, safe working practices and relevant standards, codes and regulations, including:
  - functions of a building management system:
    - autonomous functions
    - input/output (I/O)
    - general I/O
    - installation management items
    - energy management
    - risk management
    - information processing
    - objectives
    - building running costs
    - smoke control in accordance with AS 1668.1 The use of ventilation and air conditioning in buildings - Fire and smoke control in buildings
  - building management system hardware:
    - system architecture
    - communication devices
    - substations
    - personal computers
    - interfaces with other systems
  - input and output functions:
    - digital I/O
    - digital output with status feedback
    - analogue I/O

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    - sensors
    - alarms
- energy management:
    - night cycle
    - optimum stop/start
    - time and event programs
    - night purge
    - outside air percentage control
    - enthalpy control
    - power demand control
    - duty cycle
    - presence detection
    - lighting control
- information processing functions:
    - computer systems
    - central system management
    - programs
    - system configuration and security
    - operator - machine interface
    - data points
- risk and maintenance management:
    - system files
    - fire and intruder control
    - access control
- building services, plant and machinery specifications
- energy evaluation tests
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
    - environmental and sustainable energy principles and practices
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UEERA0040 Evaluate and report on the indoor air quality of buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate and report on the indoor air quality in buildings.

It includes working safely, setting up and conducting evaluation measurements, evaluating air quality from measured parameters, and reporting results, including recommending any resulting corrective actions.

Permits may be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set

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procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate and report on air quality in buildings	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures are obtained and implemented in accordance with workplace procedures
	1.2 WHS/OHS risk control measures and workplace procedures for work are followed in preparation for the work
	1.3 The extent of evaluation is determined from building ventilation/air conditioning specifications, internal/external environmental factors and discussions with relevant person/s
	1.4 Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5 Tools, testing devices and materials required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Evaluate air quality in buildings	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Need to test and measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.3	Air quality requirements and regulations in buildings are applied to the evaluation process
	2.4	Air quality evaluation tests for each parameter under scrutiny are conducted in accordance with workplace procedures and test methods
	2.5	Air quality evaluation tests are conducted methodically and results/comments systematically noted
	2.6	Unplanned situations are dealt with safely with the approval of authorised person/s
	2.7	Evaluation is conducted without damage to systems, circuits, the surrounding environment and/or services using sustainable energy practices
3 Report on air quality buildings	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Results of air quality evaluation, including unacceptable conditions and recommendations for improvement, are documented
	3.4	Energy evaluation report is forwarded to appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and reporting on indoor air quality	• two different types of buildings with or

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must include at least the following: without air conditioning

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ137A Evaluate and report on the indoor air quality of buildings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0040 Evaluate and report on the indoor air quality of buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent of the evaluation
- setting up and conducting appropriate examinations and tests
- reporting evaluation, including recommendation for improving energy efficiency
- dealing with unplanned events
- applying environmental and sustainable energy principles and practices
- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- determining need to test or measure live work
- documenting results of air quality evaluation
- evaluating and reporting on air quality in buildings
- performing air quality evaluation tests
- preparing to evaluate and report on air quality in buildings
- resolving indoor air quality problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- indoor air quality, evaluation and reporting of a building’s indoor air quality, safe working practices and relevant standards, codes and regulations including:
  - indoor air quality factors:
    - interactive nature of pollutants

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    - comfort criteria
    - source of odours
    - pathway form source to occupants
    - occupant activities
    - impact on productivity
- causes of indoor air quality problems:
    - moisture
    - mould and mildew
    - bacterial growths
    - asbestos and other particulates
    - volatile chemicals produced in the building
    - chemical products
- heating, ventilation and air conditioning (HVAC) systems:
    - types of HVAC systems
    - system components
    - duct cleaning
    - system commissioning
    - operation of system
    - damper adjustment
- measurements:
    - common parameters to measure
    - measurement devices available
    - instrument calibration
    - analysing and interpreting results
    - laboratory tests
    - standards
    - evaluation and reporting of indoor air quality
- resolving indoor air quality problems:
    - conducting indoor air quality investigations
    - the walk-through
    - building history
    - HVAC system information
    - occupant interviews
    - troubleshooting
- indoor air quality management:
    - building indoor air quality profile
    - location of potential indoor air quality problems
    - procedures to control indoor air quality
    - communication

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    - response to complaints
    - equipment preventive maintenance
    - chemical inventory
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0041 Evaluate new and alternative technologies applicable to electrotechnology applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate new and alternative technologies applicable to electrotechnology applications.

It includes working safely and comparing manufacturer's technical data for alternative or new technologies with specifications for a proposed project.

It also includes conducting evaluation tests, evaluating systems/components from technical data and/or measured parameters, and reporting findings for use in design work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate and report on alternative and new technologies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures are obtained and implemented in accordance with workplace procedures

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		1.2	WHS/OHS risk control measures and procedures for work are followed
		1.3	The extent of evaluation is determined from proposed project specifications and discussions with relevant person/s
		1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
		1.5	Tools, testing devices and manufacturer technical data required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2	**Evaluate alternative and new technologies**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2	Electrotechnology disciplines applicable to the alternative/new technology being considered are applied to the evaluation process
		2.3	Manufacturer's technical data for alternative/new technologies is compared with proposed project specifications, budget and regulations
		2.4	Evaluation tests for each component under scrutiny are conducted in accordance with WHS/OHS requirements and established test methods
		2.5	New and alternative technologies are evaluated methodically and results/comments systematically noted
		2.6	Unplanned situations are dealt with safely with the approval of authorised person/s
		2.7	Evaluation is conducted without damage to systems, circuits, the surrounding environment and/or services using sustainable energy practices
3	**Report on use of alternative and new technologies**	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures
		3.3	Results of the evaluation, including recommendations and justifications for adoption/rejection of the

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alternative and new technologies, are documented for use in design work

3.4 Report is forwarded to appropriate person/s for endorsement in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating alternative and new technologies must include at least two different proposed projects in any of the following electrotechnology disciplines:	• automated systems • computer systems • electrical • electronics • industrial electronics and control • refrigeration and air conditioning • renewable energy (RE)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ150A Evaluate new and alternative technologies applicable to electrotechnology applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0041 Evaluate new and alternative technologies applicable to electrotechnology applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent of the evaluation
- comparing manufacturer's technical data for alternative or new technologies with proposed project specifications, budget and regulations accurately
- reporting evaluation, including recommendations and justifications for adoption or rejection of the alternative and new technologies evaluated
- dealing with unplanned events
- applying environmental and sustainable energy principles and practices
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - implementing risk control measures
- conducting evaluation tests
- determining need to test or measure live work
- evaluating performance benefits and limitations of new and developed technologies for given applications
- making and documenting recommendations and justifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- new and alternative technology sources, processes for their adoption, safe working practices and relevant standards, codes and regulations including:
  - sources of information on alternative or new technologies:
    - industry organisations

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    - industry technical journals
    - government and private research papers/literature
    - manufacturers' bulletins
  - comparison of technical data from different manufacturers
  - evaluating performance benefits and limitations of new and developed technologies for given applications, encompassing:
    - capital cost-benefits
    - operations efficiency
    - risk hazardous and issues related to environmental and health and safety
    - functionality
  - processes to facilitate adoption:
    - research; analyses; reporting; recommending; and utilising a range of techniques, processes and technologies
- proposed project specifications, budget and regulations
- relevant manufacturer specifications
- relevant test methods
- relevant tools, testing devices and manufacturer technical data
- relevant WHS/OHS legislated requirements, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to evaluate thermodynamic and fluid parameters of refrigeration systems.

It includes working safely, setting up and conducting evaluation measurements, evaluating thermodynamic and fluid parameters from measured parameters, and reporting results for use in design work.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

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UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to evaluate fluid and thermodynamic parameters of refrigeration systems	**1.1** WHS/OHS procedures are obtained and implemented in accordance with workplace procedures
	1.2 WHS/OHS risk control measures and workplace

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		procedures for work are followed
	1.3	The extent of evaluation is determined from specifications for the refrigeration system and discussed with relevant person/s
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with others
	1.5	Tools, testing devices and materials required for work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Evaluate parameters of refrigeration systems	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Need to test and measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.3	Fluid and thermodynamic parameters are applied to the evaluation process
	2.4	Energy evaluation tests for each parameter under scrutiny are conducted in accordance with workplace procedures and test methods
	2.5	Fluid and thermodynamic parameter evaluation tests are conducted methodically and results/comments systematically noted
	2.6	Unplanned situations are dealt with safely with the approval of authorised person/s
	2.7	Evaluation is conducted without damage to systems, circuits, the surrounding environment and/or services using sustainable energy practices
3 Report on evaluation of fluid and thermodynamic parameters of refrigeration systems	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Results of fluid and thermodynamic parameters evaluation are documented for use in design work
	3.4	Energy evaluation report is forwarded to appropriate

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	person/s for endorsement in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Evaluating and reporting fluid and thermodynamic parameters must include at least the following:	• two types of refrigeration systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ165A Evaluate thermodynamic and fluid parameters of refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent of the evaluation
- setting up and conducting appropriate examinations and tests
- documenting evaluation results for use in design work
- dealing with unplanned events
- applying environmental and sustainable energy principles and practices
- applying relevant legislation, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- determining need to test or measure live work
- documenting results of evaluation
- evaluating fluid and thermodynamic parameters of refrigeration systems
- performing fluid and thermodynamic evaluation tests
- preparing to evaluate fluid and thermodynamic parameters of refrigeration systems
- reporting on evaluation of fluid and thermodynamic parameters of refrigeration systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- thermodynamics and fluid fundamentals, refrigeration engineering mathematics, safe working practices and relevant standards, codes and regulations, including:
  - matrices:
    - the operations: addition (subtraction), scalar multiplication and matrix multiplication up to 3x3 matrices

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- identity matrix and inverse matrix
- elementary algebraic manipulation of matrices
- solve up to three equations (linear) in three unknowns using inverse matrices and determinants

- quadratic functions:
  - graphs of quadratic functions represented by parabolas and significance of the leading coefficient
  - zeros represented graphically
  - quadratic equations by factoring and quadratic formula
  - simultaneously linear and quadratic equations algebraically and geometrically
  - engineering mathematics - B
- exponential and logarithmic functions:
  - laws of indices
  - graph of f(x) = kabx, emphasising a = 10, e
  - definition of the logarithm to any base
  - graph of f(x) = k loga bx, emphasising a = 10, e
  - solve exponential and simple log equations using indices, logs, calculator and graphically
  - change of log base, emphasising 10 and e
  - growth and decay
- trigonometric functions:
  - the ratios: sin, cos, tan, cosec, sec and cot
  - degrees, radians
  - graphs of k f(ax + b) where f(x) = sin x, cos x, tan x, and significance of k,a,b, for example V = Vm sin (wt+ f)
  - trigonometric identities
- energy and humanity:
  - need for energy and relationship between energy usage and standard of living
  - energy conversion - typical processes and efficiencies
  - sources of energy
  - solar energy - direct heating, photosynthesis, solar cells, power tower, hydrogen for solar energy, ocean thermal energy collector, solar ponds, wind and wave energy, and hydro-electric power
  - geothermal energy
  - tidal energy
  - nuclear energy - fission and fusion, burner and breeder reactors
  - stored fuel reserves
  - fuel conservation - reduction in wastage, recycling, greater usage efficiency and use of waste heat
  - thermodynamics
- basic concepts:

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  - nature of matter - atoms, molecules, inter-molecular forces, molecular motion and states of matter
  - mass and conservation of mass principle
  - volume, density, specific volume and relative density
  - force, weight and pressure (atmospheric, gauge and absolute)
  - temperature (Celsius and Kelvin)
  - systems and black box analysis
  - reciprocating piston and cylinder mechanism – pressure ratio and compression ratio
- energy:
  - definition and principles
  - potential energy
  - kinetic energy
  - work (linear and rotational), constant and variable force, relationship to pressure and volume change
  - power (linear and rotational)
  - sensible heat - specific heat capacity (constant pressure and constant volume)
  - latent heat
  - chemical energy - energy content of a fuel
  - internal energy
  - energy transfer in closed and open systems
  - definition of a closed system
  - calorimetry as an example of a closed system (with or without phase change)
  - thermodynamics 1
  - non-flow energy equation - typical applications such as stirring with simultaneous heating or cooling
  - definition of an open system
  - mass and volume flow rate and continuity equation
  - steady flow energy equation (negligible change in kinetic or potential energy) leading to the concept of enthalpy - typical applications such as turbines, compressors, boilers and heat exchangers
- gases:
  - definition of a perfect or ideal gas in terms of the molecular model
  - general gas equation
  - characteristic gas equation (equation of state)
  - constant pressure process
  - constant volume process
  - isothermal process
  - polytropic process
  - adiabatic process
- heat engines:

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  - definition of a heat engine
  - essentials of a heat engine - heat source, heat sink, working substance, mechanical power output and working cycle
  - energy balance for a heat engine (as a black box) and efficiency
  - maximum possible efficiency (Carnot efficiency)
  - types of heat engines according to working substance, heat source, mechanical arrangement and working cycle
  - typical practical cycles - Stirling, Otto, diesel, dual, two stroke (spark and compression ignition) and Joule cycle
  - thermodynamics 1
- heat engine performance:
  - measurement of torque and power output - rope brake, shoe brake, hydraulic dynamometer and electric dynamometer
  - heat supply rate, efficiency and specific fuel consumption
  - measurement of indicated power - mechanical indicator, electric/electronic indicator and Morse test
  - friction power, mechanical efficiency and indicated thermal efficiency
  - volumetric efficiency
  - energy balance
  - performance curves - variable load constant speed, and variable speed constant throttle setting
- basic properties of fluids:
  - description of a fluid and the difference between solids and fluids, liquids and gases, hydraulics and pneumatics
  - chemical properties, reaction with metals, corrosiveness, flammability, toxicity, pollution and environmental
  - effects
  - dissolves gases and particles in liquids (slurries)
  - foaming of liquids: basic properties and units - mass, volume, density, specific volume, relative density, force and weight, pressure (absolute, atmospheric and gauge), temperature (Celsius and Kelvin), viscosity and surface tension
  - vapour pressure of a liquid - saturation vapour pressure
  - temperature and pressure effects on the basic properties
  - ideal/perfect gases and liquids
  - gas laws for ideal gases
  - fluid mechanics 1
- components:
  - pipes, channels, tubes and ducts (rigid and flexible)
  - valves - gate, globe, non-return/foot, needle, ball, plug cock, diaphragm, pressure regulating/reducing and safety
  - valves

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  - filters and strainers for gases and liquids
  - gauges and instruments - pressure and temperature gauges, liquid level gauges, thermometers, thermocouples, manometers and piezometers
  - pipe fittings - elbows/bends, enlargement/contractions, coupler/unions and tees
  - tanks and vessels - storage tanks, pressure vessels, header and surge tanks, and weirs/dams/reservoirs
  - nozzles/spray heads
  - flow measurement instruments - venturi and orifice meters, pitot tube, rotameter and anemometer (fan/hot wire)
  - pumps/compressors and motors/turbines
  - actuators - linear (cylinders) and rotary
  - selection of equipment and instruments considering properties and compatibility
- fluid statics:
  - pressure at a point, direction of pressure on a surface
  - pressure variation with depth in a liquid
  - Pascal’s Principle
  - manometer/piezometer calculations (vertical and inclined)
  - forces due to fluid pressure on vertical, horizontal and inclined surfaces
  - centre of pressure
  - Archimedes Principle - buoyancy, flotation, apparent weight and centre of buoyancy
  - fluid flow
  - steady and unsteady flow, streamlines and eddies
  - velocity - average or mean and local
  - mass and volume flow rate
  - conservation of mass leading to the Continuity Equation for fluid flow
  - modification of the Continuity Equation for volume flow of liquids or gases with small changes in density
  - Bernoulli Equation for ideal fluids, meaning of pressure, velocity and potential head and total head
  - causes of head loss and modification of the Bernoulli Equation to include a head loss term for real fluids
- fluid power:
  - definition and units for work, torque and power
  - relationship between force, velocity and power and torque, angular velocity and power
  - work done by a gas expanding at constant pressure
  - relationship between fluid power, mass flow rate and head
  - relationship between fluid power, volume flow rate and pressure
  - efficiency of a pump or turbine
  - modification of the Bernoulli Equation to include a pump or turbine in the fluid circuit as well as a head loss term
- forces developed by flowing fluids:

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    - impulse-momentum equation for fluid flow
    - force developed by a jet striking a stationary plate - perpendicular, inclined or curved
    - force developed by a jet striking a moving plate or blade
    - force developed by a jet striking a series of moving plates or blades - power developed and efficiency
- refrigeration system specifications
- relevant manufacturer specifications
- relevant test methods
- relevant WHS/OHS legislated requirements, including:
    - risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0043 Find and rectify faults in appliance control systems and devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair electrical faults in appliance control systems and devices.

It includes working safely, using fault-finding procedures, conducting appliance control systems and devices repairs, and completing required service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find faults in appliance control system and devices	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be completed is planned from fault and breakdown reports and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from the supervisor to ensure work is coordinated with others
	1.4 Sources of materials required for work are accessed in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Find and repair electrical faults in appliance control system and devices	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from fault or breakdown are identified and documented, and risk control measures are implemented in accordance with workplace procedures and in consultation with appropriate person/s
	2.4 Fault finding, using measured and calculated values of circuit/control parameters, is undertaken in accordance with workplace procedures
	2.5 Appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage
	2.6 Suspected faulty control device component or circuit is rechecked and fault status is confirmed
	2.7 Replacement parts are obtained in accordance with workplace procedures
	2.8 Effectiveness of repair work is tested in accordance with workplace procedures

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	2.9 Apparatus is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.10 Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of authorised person/supervisor
	2.11 Fault-finding and repair activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1** Reusable faulty or worn components are tagged and despatched for repair in accordance with workplace procedures
	3.2 Maintenance and repair work are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Finding and rectifying faults in appliance control systems and devices must include at least the following:	• two different types of appliances
	• four of the following faults:
	  • open circuit
	  • short circuit
	  • incorrect connections
	  • insulation failure
	  • unsafe condition
	  • motor component failure
	  • control circuit component failure
	  • related mechanical failure

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ154A Find and rectify faults in appliance control systems and devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0043 Find and rectify faults in appliance control systems and devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying risk control measures
  - identifying hazards
  - utilising safe working practices
- completing and reporting fault-finding and repair activities
- finding and rectifying faults in appliance control systems and devices, including:
  - completing documentation
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - finding faults
  - planning extent of work from fault/breakdown reports and discussions with supervisor/appropriate person/s
  - rectifying faults
  - using approved methodical fault-finding techniques
- preparing to find and rectify faults in appliance control systems and devices
- using manufacturer specifications.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- finding and rectifying faults in appliance control systems and devices, including:
  - appliance characteristics and control parameters
  - appliance integrated communications components and their function
  - control systems and components, including appliance controls and electrical and/or

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electronic controls
    - control terminology
    - operation and application of electrical, electronic and mechanical appliance diagnostic tools, including types and construction
    - system responses to parameter changes
    - types of control
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
    - potential hazards
    - risk control measures
    - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0044 Find and rectify faults in single phase motors and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair faults in motors and associated controls connected to single phase, 240 volt (V) supply, in refrigeration and air conditioning systems.

It includes working safely, using fault-finding procedures, conducting repairs to motor and associated control components, and completing required service documentation. The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the commissioning and repair of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and rectify faults in single phase motors and associated controls	**1.1** WHS/OHS hazards, risk control methods, relevant industry standards, codes of practice and legislation are obtained and applied in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Supervisor is consulted to ensure work is coordinated with others in accordance with workplace procedures
	1.4 Tools, equipment and testing devices to locate faults are obtained and checked for operational safety in accordance with workplace procedures
2 Find and repair faults in single phase motors and associated controls	**2.1** Need to test and measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Equipment is checked and isolated in accordance with workplace procedures, regulatory requirements and WHS/OHS requirements
	2.3 Fault finding, using measured and calculated values of circuit and/or motor parameters, is undertaken in accordance with workplace procedures and regulatory requirements
	2.4 Repair work is carried out in accordance with manufacturer specifications and workplace procedures

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	2.5	Repair work is tested in accordance with workplace procedures
	2.6	Apparatus is reassembled, tested and prepared for return to service in accordance with workplace procedures and regulatory requirements
	2.7	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.8	Fault-finding and repair activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report on fault-finding and repair of single phase motors and associated controls	**3.1**	WHS/OHS work completion risk control measures are applied in accordance with workplace procedures
	3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.3	Supervisor is notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and rectification of single phase motors and associated controls must include at least the following:	• two different refrigeration and/or air conditioning systems
Fault finding and rectification of single phase motors and associated controls must include at	• control circuit component failure • incorrect wiring connections

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least two of the following faults:	• motor bearing failure • open-circuit winding • short circuit, including insulation failure to frame • shunted short, including insulation failure within winding

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0044 Find and rectify faults in single phase motors and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including hazards and control measures
- disconnecting and reconnecting electrical supply to motors and associated controls
- finding and rectifying faults in single phase motors, related motor starting components and motor protection devices in refrigeration and air conditioning systems
- implementing relevant standards, codes of practice and regulations
- reporting/documenting fault-finding and repair activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- circuit diagrams for single phase motors
- relevant risk mitigation processes while finding and rectifying faults in motors and associated controls, including potential hazards, risk control methods and safe working practices
- relevant standards, codes of practice, regulations and manufacturer specifications
- single phase motor speed control in refrigeration and air conditioning systems, including:
  - inverters - variable speed control (VSC)/variable frequency control (VFC)
  - number of poles
- types and applications of single phase motor starting relays and protection devices used in refrigeration and air conditioning systems, including:
  - current coil relays
  - positive temperature coefficient (PTC) or solid state
  - potential coil relays
  - soft starters
  - thermal disc (Klixon) overloads
- types and applications of single phase motors used in refrigeration and air conditioning

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systems, including:

- capacitor start capacitor run (CSCR)
- capacitor start induction run (CSIR)
- electronic commutator (EC)
- permanent split capacitor (PSC)
- resistance start induction run (RSIR)
- shaded pole

- typical faults in single phase motors and associated controls for refrigeration and air conditioning systems, including:
  - control circuit component failure
  - incorrect wiring connections
  - motor bearing failure
  - open-circuit winding
  - short circuit, including insulation failure to frame
  - shunted short, including insulation failure within winding.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0045 Find and rectify faults in three phase motors and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair faults in motors and associated controls connected to three phase, 415 volts (V) supply, in refrigeration and air conditioning systems.

It includes working safely, using fault-finding procedures, conducting repairs to motor and associated control components, and completing required service documentation. The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the commissioning and repair of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to find and rectify faults in three phase motors and associated controls	**1.1** WHS/OHS hazards, risk control methods, relevant industry standards, codes of practice and legislation are obtained and applied in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Supervisor is consulted to ensure work is coordinated with others in accordance with workplace procedures
	1.4 Tools, equipment and testing devices to locate faults are obtained and checked for operational safety in accordance with workplace procedures
2 Find and repair faults in three phase motors and associated controls	**2.1** Need to test and measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Equipment is checked and isolated in accordance with workplace procedures, regulatory requirements and WHS/OHS requirements
	2.3 Fault finding, using measured and calculated values of circuit and/or motor parameters, is undertaken in accordance with workplace procedures and regulatory requirements
	2.4 Repair work is carried out in accordance with manufacturer specifications and workplace procedures

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	2.5	Repair work is tested in accordance with workplace procedures
	2.6	Apparatus is reassembled, tested and prepared for return to service in accordance with workplace procedures and regulatory requirements
	2.7	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.8	Fault-finding and repair activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report on fault-finding and repair of three phase motors and associated controls	**3.1**	WHS/OHS work completion risk control measures and procedures are applied in accordance with workplace procedures
	3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.3	Supervisor is notified of completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Fault finding and rectification of three phase motors and associated controls must include at least the following:	• two different refrigeration and/or air conditioning systems
Fault finding and rectification of three phase motors and associated controls must include at	• control circuit component failure • incorrect phase connections

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least of two of the following faults:	• motor bearing failure • open-circuit winding • short circuit, including insulation failure to frame • shunted short, including insulation failure within winding

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0045 Find and rectify faults in three phase motors and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including hazards and control measures
- disconnecting and reconnecting electrical supply to motors and associated controls
- finding and rectifying faults in three phase motors, related motor starting components and motor protection devices in refrigeration and air conditioning systems
- implementing relevant standards, codes of practice and regulations
- reporting and documenting fault-finding and repair activities.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- circuit diagrams for three phase motors
- relevant risk mitigation processes while finding and rectifying faults in motors and associated controls, including potential hazards, risk control methods and safe working practices
- relevant standards, codes of practice, regulations and manufacturer specifications
- three phase motor speed control in refrigeration and air conditioning systems, including:
  - inverters variable speed control (VSC)/variable frequency control (VFC)
  - number of poles
- types and applications of three phase motor starting and protection devices used in refrigeration and air conditioning systems, including:
  - direct online (DOL)
  - soft starters
  - STAR/DELTA
  - thermal overloads
- types and applications of three phase motors used in refrigeration and air conditioning systems, including:

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  - DELTA connected
  - STAR connected
- typical faults in three phase motors and associated controls for refrigeration and air conditioning systems, including:
  - control circuit component failure
  - incorrect wiring connections
  - motor bearing failure
  - open-circuit winding
  - short circuit, including insulation failure to frame
  - shunted short, including insulation failure within winding.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0046 Install and commission ammonia refrigeration systems, components and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and commission ammonia refrigeration system, components and associated equipment.

It includes installing and commissioning refrigeration equipment using ammonia as the refrigerant. It also includes applying safe working practices and refrigeration principles that apply to ammonia, interpreting plans and specifications, commissioning and completing the necessary commissioning documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation and commissioning of refrigeration systems using ammonia refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install ammonia refrigeration system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards not previously identified are reported, assessed and advice on risk control measures sought from the project engineer
	1.3 Nature of work is obtained from documentation or from project engineer to determine the scope of work to be undertaken
	1.4 Advice is sought from the project engineer to ensure refrigeration work is coordinated effectively with others
	1.5 Sources of materials required for work are determined in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
2 Install and commission ammonia refrigeration system	**2.1** Measuring system operating parameters are conducted in accordance with WHS/OHS requirements and workplace procedures
	2.2 Major components and pipe work are installed in accordance with relevant industry standards, codes of practice and regulations
	2.3 Pressure testing is conducted at a pressure compatible with ammonia and in accordance with industry standards and practices
	2.4 Precautions are taken to prevent damage to components while pressure testing the system

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	2.5 Leaks are located and rectified using testing methods appropriate to the refrigeration system and in accordance with industry standards and practices
	2.6 Refrigeration system is evacuated in accordance with industry standards and practices
	2.7 Refrigeration system is charged safely with ammonia and lubricants in accordance with industry standards and practices
	2.8 Refrigeration pre-operational checks are carried out on operating and safety controls in accordance with manufacturer specifications
	2.9 Refrigeration system is commissioned and adjustments made to operating and safety controls
	2.10 Temperature reduction of cool rooms and freezers are undertaken in accordance with industry standards and practices
	2.11 Refrigeration maintenance is carried out and includes inspection and cleaning of strainers and filters and collection of oil sample for analysis
	2.12 Training is conducted for person/s responsible for the refrigeration system operation and maintenance
3 Complete and report on commissioning of ammonia refrigeration system	**3.1** Worksite is cleaned and made safe in accordance with workplace procedures
	3.2 Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory requirements
	3.3 Refrigeration operation condition and commissioning data are documented and includes parameters not within the specified range for the system
	3.4 Refrigeration mechanical and electrical commissioning documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and commissioning ammonia refrigeration system must include at least the following:	• determining:
	  • suction and discharge pressures
	  • ambient, evaporator and condensing temperatures
	  • evaporator and condenser temperature difference
	  • critical point of ammonia (R717)

Charging and discharging must include the following:	• ammonia (R717) system with refrigerant and lubricant in a safe and environmentally responsible manner •

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ180A Install and commission ammonia refrigeration systems, components and associated equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0046 Install and commission ammonia refrigeration systems, components and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislative, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- conducting refrigeration system operation and maintenance
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly
- identifying the conditions of the ammonia (R717) refrigerant at various locations in the vapour compression and liquid recirculation system
- installing, connecting, securing and aligning components and equipment and ensuring that equipment and pipe work is compliant with relevant industry standards, codes of practice and regulations
- locating and rectifying leaks
- optimising system performance and efficiency
- pressure testing entire system at the appropriate design test pressures
- pressure testing, charging/discharging refrigerant/lubricants and determining the operating conditions of ammonia vapour compression and liquid recirculation refrigeration system
- recording measurements
- removing system contaminants and evacuating
- selecting and using appropriate measuring devices correctly
- using calculation methods accurately
- using methodical and efficient commissioning techniques in accordance with workplace procedures.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- cool room and freezer construction, including:
  - commissioning procedures
  - construction materials
  - construction methods
  - defrost methods
  - underfloor heating
- installation and commissioning techniques for ammonia refrigeration systems
- insulation and vapour barrier, including insulation materials and vapour barriers
- refrigeration control system testing and adjustment, including:
  - central programmable logic controller (PLC) system
  - defrost methods and controls
  - flow controls
  - refrigerant level controls
  - refrigerant pressure controls
  - temperature controls
- refrigerant piping, including:
  - hydraulic shock
  - installation principles
  - material compatibility
  - pipe sizing principles
  - pressure testing/evacuation
  - relief valves
  - welding
- relevant job safety assessments or risk mitigation processes
- relevant legislative, industry standards and practices
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including reports on installation and commissioning of ammonia refrigeration systems
- relevant workplace policies and procedures, including workplace emergency response plan
- testing and commissioning ammonia refrigeration systems, including:
  - air cooled condensers
  - compressors
  - direct contact freezing
  - evaporative condensers
  - evaporators (air/fluid cooling)

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- high pressure receivers
- secondary refrigerants
- start-up and shutdown procedures
- water cooled condensers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing and commissioning, as well as determining the operating conditions of ammonia vapour compression and liquid recirculation systems
- applicable documentation, including workplace procedures, emergency response plan, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0047 Install and commission carbon dioxide refrigeration systems, components and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and commission carbon dioxide (CO^2) refrigeration system, components and associated equipment.

It includes installing and commissioning refrigeration equipment using CO^2 as a refrigerant excluding self-contained trans-critical systems.

It also includes applying safe working practice and refrigeration principles that apply to CO^2, following design specifications; testing, locating and rectifying faults and defective components; and completing the necessary installation and commissioning documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation and commissioning of refrigeration systems using CO^2 refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0053 Install, commission, service and maintain medium temperature systems

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install **CO^2** refrigeration components and associated equipment	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards not previously identified are reported, assessed and advice on risk control measures is sought from work supervisor
	1.3 Nature of work is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Refrigeration component and equipment installation is appropriately sequenced in accordance with job schedule
	1.5 Sources of materials required for refrigeration work are obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
2 Install CO^2 refrigeration system	**2.1** Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Refrigeration components and equipment are installed in accordance with technical industry standards, job specifications and requirements with sufficient access to affect electrical and pipe work connections and maintenance

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	2.3	Refrigeration components and equipment are installed straight and square, in the required locations and within acceptable tolerances
	2.4	Pressure testing is conducted at a pressure compatible with CO^2 and in accordance with industry standards
	2.5	Leaks are located and rectified using testing methods appropriate to the system and in accordance with industry standards and practices
	2.6	Refrigeration system is evacuated to the required level and cleaned of moisture and contaminants in accordance with industry standards and practices
	2.7	Unplanned situations are responded to in accordance with workplace procedures, discussed with appropriate person/s and documented in a manner that minimises risk to personnel and equipment
	2.8	Installation and tests are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices
3 Commission CO^2 refrigeration system	**3.1**	Commissioning work is appropriately sequenced in accordance with job specification
	3.2	Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	3.3	Extent of the system and location of system components is determined from site inspection and/ or job specifications and diagrams
	3.4	System control settings and operating parameters are determined from job specifications and requirements
	3.5	Tools, equipment and testing devices needed to commission a CO^2 refrigerant system are obtained and checked for correct operation and safety
	3.6	Refrigeration system is charged safely with refrigerant grade CO^2 and compatible lubricants in accordance with industry standards and practices
	3.7	Refrigeration actual and specified range of operating conditions are determined from measured and calculated values as they apply to CO^2 vapour compression and

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		volatile secondary (liquid recirculation/cascade) system in accordance with workplace procedures
	3.8	Pre-commissioning checks are undertaken to ensure components are in place and secure in accordance with manufacturer specifications and industry standards
	3.9	Need to test or measure live operating CO^2 system is determined in accordance with WHS/OHS requirements and workplace safety procedures
	3.10	CO^2 refrigeration system pressure controls, valves, pumps and regulators are adjusted to their required settings
	3.11	Testing/measuring devices are used to observe the operation of refrigeration system and fine adjustments of controls are made as required in accordance with manufacturer specifications
	3.12	Commissioning is conducted efficiently, without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices
4 Complete work and relevant documentation	**4.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	4.2	Final check of the installed components and equipment is made to verify that it complies with relevant industry standards and job requirements
	4.3	'As-installed' refrigeration components and equipment are documented and appropriate person/s notified in accordance with workplace established procedures
	4.4	Commissioning results are documented and include final operating parameters of the refrigeration system

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, connecting and commissioning CO^2 refrigeration system, components and associated equipment must include at least the following:	• major components:
	  • compressors
	  • cascade condensers
	  • evaporators
	  • liquid recirculation pump/s
	• associated equipment:
	  • refrigerant piping
	  • refrigerant flow controls
	  • cycling controls
	  • safety controls
	  • relief valves
	  • isolation valves
	  • monitoring and inspection accessories
	Note: Steel pipe welding competency is not covered by this unit.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ186A Install and commission carbon dioxide refrigeration systems, components and associated equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0047 Install and commission carbon dioxide refrigeration systems, components and associated equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- installing carbon dioxide (CO^2) refrigeration system components, pipe work and associated equipment
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly (commissioning)
- identifying the conditions of the CO^2 refrigerant at various locations in the vapour compression and volatile secondary (liquid recirculation) system
- installing, connecting, securing and aligning components and equipment and ensuring that equipment and pipe work is compliant with relevant industry standards, codes of practice and regulations
- locating and rectifying leaks
- optimising system performance and efficiency
- pressure testing entire system at the appropriate design test pressures using dry nitrogen
- reading and interpreting drawings to pipe work layouts and apparatus locations
- recording measurements
- removing system contaminants and evacuating
- selecting and using appropriate measuring devices correctly
- using calculation methods accurately
- using methodical and efficient commissioning techniques.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- installation and commissioning procedures for CO^2 refrigeration systems, including:
  - materials and installation procedures:
    - material selection
    - copper pipe standards
    - steel pipe standards
    - pipe connections
    - pipe supports hangers and connections
    - arrangement of isolation valves
    - location of relief valves
  - commissioning:
    - pressure testing
    - evacuation and dehydration
    - charging refrigerant and lubricant
    - system testing and adjustment
    - documentation
- operating conditions of CO^2 vapour compression and volatile secondary (liquid recirculation/cascade) system/s
- relevant industry standards and practices
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0048 Install and commission flammable refrigerant air conditioning and refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and commission Class A2, A2L and A3 flammable refrigerant air conditioning and refrigeration systems, components and associated equipment in accordance with legislative, standard and code requirements. It includes working safely and installing equipment, components and piping to job specifications. It also includes completing pre-commissioning tests, starting the system, ensuring correct refrigerant charge, adjusting components and controls to efficient operation, completing installation and commissioning documentation.

Some flammable refrigerants, for example, fluorocarbons like R32, are controlled under the national Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995. Therefore, to undertake this unit, the learner must have a relevant Trainee Refrigerant Handling Licence if it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence if it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install and commission flammable refrigerant refrigeration and air conditioning systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards not previously identified are noted and risk control measures implemented
	1.3 Scope of work is determined from documentation and/or relevant person/s to establish work to be undertaken
	1.4 Component, equipment installation and commissioning work are sequenced in accordance with job schedule
	1.5 Relevant person/s is consulted to ensure the work is coordinated with others involved
	1.6 Materials required to install pipe work are obtained in accordance with workplace procedures and job specifications
	1.7 Tools, equipment and testing devices required to install and commission components and equipment are obtained in accordance with workplace procedures and checked for correct operation and safety

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	1.8	System control settings and operating parameters are determined from job specifications
	1.9	Preparatory work is scheduled to ensure no damage has occurred in accordance with workplace procedures and relevant industry standards
2 Install flammable refrigerant refrigeration and air conditioning systems	**2.1**	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2	Components and equipment are installed with sufficient access to affect electrical and pipe work connections and maintenance in accordance with relevant legislation, standards and code requirements, manufacturer instructions, job specifications and workplace procedures
	2.3	Components and equipment are installed in the required locations and within acceptable tolerances in accordance with relevant legislation, standards and code requirements, manufacturer instructions, job specifications and workplace procedures
	2.4	Refrigerant tubing and fittings are silver brazed with dry nitrogen to prevent contamination in accordance with relevant legislation, standards and code requirements, manufacturer instructions, job specifications and workplace procedures
	2.5	Unplanned situations from installation of components and equipment are dealt with in accordance with workplace procedures
	2.6	Quality checks of pipe work, pressure testing and repair of leaks are conducted in accordance with relevant legislation, standard and code requirements, manufacturer instructions, job specifications and workplace procedures
	2.7	Components and equipment are installed efficiently without waste of materials or damage/contamination to apparatus, the surrounding environment or services using sustainable energy practices
3 Commission flammable refrigerant refrigeration and air conditioning	**3.1**	Installed system’s pipe work and components are evacuated to the required level in accordance with relevant legislation, standards and code requirements

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systems		and manufacturer instruction
	3.2	System is charged with flammable refrigerant to the required level in accordance with relevant legislation, standard and code requirements, manufacturer instructions and job specification
	3.3	Refrigeration system pressure controls, valves and regulators are adjusted in accordance with relevant legislation, standard and code requirements, manufacturer instructions, job specifications and workplace procedures
	3.4	Testing/measuring devices are used to observe operation of the refrigeration system and fine adjustments of controls made, as required, in accordance with relevant legislation, standard and code requirements, manufacturer instructions, job specifications and workplace procedures
	3.5	Unplanned situations are dealt with safely and with the approval of relevant person/s
	3.6	Commissioning is conducted efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
4 Complete installation and commissioning work	**4.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	4.2	Final check of the installed components and equipment is made in accordance with relevant industry standards and job specifications
	4.3	'As installed' components and equipment are documented and relevant person/s notified in accordance with workplace procedures
	4.4	Results of commissioning and final operating parameters are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing and commissioning major components and associated equipment must include at least the following:	• two refrigeration and/or air conditioning systems operating with a flammable refrigerants refrigerant
Major components must include at least the following:	• refrigeration compressors • condensers • condensing units • evaporators
Associated equipment must include at least the following:	• refrigerant flow controls • cycling controls • safety controls • on-site leak detection equipment • ventilation systems • spark isolation systems and electrical isolation • monitoring equipment • inspection accessories

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ176A Install and commission hydrocarbon refrigeration systems, components and associated equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0048 Install and commission flammable refrigerant air conditioning and refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- commissioning flammable refrigerants systems
- completing installation and commissioning reports and documentation
- dealing with unplanned events
- discharging/recovering and charging refrigerant/lubricants safely and without damage to components
- evacuating the system to the required level safely and without damage to components
- identifying the conditions of the refrigerant at various locations
- installing flammable refrigerants refrigeration and air conditioning systems
- installing, connecting, securing and aligning components and equipment
- locating and rectifying leaks
- preparing to install and commission flammable refrigerants refrigeration and air conditioning systems
- pressure testing the system to the required level safely and without damage to components
- reading and interpreting drawings to pipe work layouts and apparatus locations
- recording measurements
- selecting and using appropriate measuring devices correctly
- using commissioning techniques
- using sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant codes, regulations and standards

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- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant site arrangements, including pipe work requirements and equipment location
- relevant special features for flammable refrigerant systems, including component compatibility, refrigerant leakage and enclosures
- relevant system diagrams
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, policies and procedures
- sustainable energy principles and practices
- system commissioning requirements and procedures
- system, pipe work and component installation requirements and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to installing and commissioning flammable refrigerant air conditioning and refrigeration system
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0049 Install and start up single head split air conditioning and water heating heat pump systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to position, assemble, install, start up and decommission single head split air conditioning systems and water heating heat pump split systems, up to a maximum of 18 kilowatt (kW) refrigeration capacity.

It includes following standards, codes of practice, regulatory requirements and routine procedures to install equipment, connect pipe work, pressure test, evacuate, perform functional checks and complete required documentation.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0064 Recover, pressure test, evacuate, charge and leak test refrigerants - split systems

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble, install and start up split air conditioning and water heat pump system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards which have not previously been identified are assessed, reported and advice on risk control measures sought from supervisor
	1.3 Work activities are sequenced in accordance with job schedule
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5 Layout of pipe work to be installed is determined from job/task details, including manufacturer specifications and diagrams
	1.6 Materials needed to carry out the work are obtained in accordance with workplace procedures and checked against job/task requirements
	1.7 Tools, equipment and testing devices are obtained in accordance with workplace procedures and checked for operation and safety
	1.8 Appropriately licensed electrician is confirmed to carry out electrical work for the air conditioning and water heat pump system
	1.9 Appropriately licensed plumber is confirmed to carry out mains water piping work for the heat pump hot water system
	1.10 Preparatory work is checked to ensure no damage has occurred and complies with job/task requirements in

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		accordance with workplace procedures
2 Assemble, install and start up split air conditioning and water heat pump system	**2.1**	Split air conditioning and water heat pump system components are positioned and assembled in accordance with workplace procedures, manufacturer instructions and industry standards
	2.2	Interconnecting refrigerant piping/tubing is prepared and installed in accordance with workplace procedures, manufacturer instructions and industry standards
	2.3	Components are pressure tested and evacuated in strict accordance with manufacturer instructions, industry standards and codes of practice
	2.4	Condensate drains are prepared and installed to the units in accordance with workplace procedures, manufacturer instructions, industry standards and local regulatory requirements
	2.5	The refrigerant service valves are opened on the pre-charged outdoor unit to enable the refrigerant to enter the evacuated pipe work and the connected unit in strict accordance with manufacturer instructions and industry standards
	2.6	Unplanned situations are discussed with relevant person/supervisor, documented and dealt with safely in accordance with workplace procedures
	2.7	Quality checks of installation and start-up are undertaken in accordance with workplace procedures
	2.8	Notification is given to relevant person/s that the split air conditioning and water heat pump system is ready for electrical and/or mains water connection in accordance with workplace procedures
	2.9	Split air conditioning and water heat pump work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services using relevant workplace sustainable energy principles in accordance with workplace procedures
3 Test single head split air conditioning and water heat pump system	**3.1**	Split air conditioning and water heat pump system performance is inspected and tested in accordance with workplace procedures to ensure compliance with industry technical standards, manufacturer specifications

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		and job/task requirements
	3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.3	Work completion is documented and appropriate person/s notified in accordance with workplace procedures
4 Decommission split air conditioning and water heat pump system	**4.1**	Refrigerant is pumped down and/or recovered from indoor unit, interconnecting refrigerant piping/tubing is removed, and indoor and outdoor refrigerant circuits are sealed in accordance with workplace procedures, manufacturer instructions and industry standards
	4.2	Licensed electrician is engaged in accordance with workplace procedures to isolate and disconnect electrical supply and cabling from air conditioning and water heat pump system
	4.3	Indoor and outdoor refrigerant pipework, water pipework, condensate drains and electrical conduits/cables are unmounted in accordance with workplace procedures
	4.4	Unplanned situations are discussed with appropriate person/s, documented and dealt with safely in accordance with workplace procedures
	4.5	Split air conditioning and water heat pump work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services using relevant workplace sustainable energy principles
	4.6	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	4.7	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling, installing, starting up and decommissioning single head split air conditioning and water heat pump system (hot water or swimming pool) up to a maximum of 18 kW refrigeration capacity must include at least the following:	• condensate drain installation • decommissioning • evacuation • functional performance check • installation/regulatory documentation • pipe work connection • pressure test • refrigerant pipework installation • use of safe working procedures and industry standards and code of practice
Electrical connection must be carried out by:	• unrestricted licensed electrician
Mains water connection must be carried out by:	• appropriately licensed plumber
Making area/worksite safe must include at least the following:	• leak testing and fitting of caps to all refrigerant access ports, which could allow refrigerant to escape into the environment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ105A Position, assemble and start up single head split air conditioning and water heating heat pump systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0049 Install and start up single head split air conditioning and water heating heat pump systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying safe working practices and relevant legislation, industry standards, codes of practice and regulations
- applying sustainable energy principles and practices
- assembling, installing and starting up split air conditioning and/or water heat pump system
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- decommissioning split air conditioning and/or water heat pump system
- determining job/work task requirements and applying workplace procedures, including making equipment/worksite safe
- documenting work activities
- giving notification to appropriate person/s for electrical connections to be completed
- implementing risk control measures
- inspecting and testing single head split air conditioning and/or water heat pump system and documenting performance to manufacturer specifications, including undertaking functional performance checks
- making equipment and worksites safe through leak testing and fitting of caps to refrigerant access ports to stop refrigerant escaping into the environment
- positioning and assembling system components to specifications
- installing and connecting refrigerant piping
- installing and connecting condensate drain piping
- preparing to assemble, install and start up a single head split air conditioning system and/or water heat pump system with a maximum cooling/heating capacity of less than 18 kilowatt (kW)
- pressure testing and evacuating system using manufacturer instructions.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- condensate drain pipe work installation and connections
- refrigerant pipe work installation and connections
- relevant A1 and A2L class refrigerant, systems, piping, tools and equipment
- relevant codes of practice, industry standards, regulations and WHS/OHS legislated requirements, including:
    - AS/NZS 5141 Residential heating and cooling systems - Minimum applications and requirements for energy efficiency, performance and comfort criteria
    - AS/NZS 5149.3 Refrigerating systems and heat pumps - Safety and environmental requirements - Installation site
    - AS/NZS 5149.4 Refrigerating systems and heat pumps - Safety and environmental requirements - Operation, maintenance, repair and recovery
    - Australia and New Zealand Refrigerant Handling Code of Practice - Part 2 Systems other than self-contained low charge systems
    - Ozone Protection and Synthetic Greenhouse Gas Management Regulations
- relevant manufacturer specifications and instructions relevant risk mitigation processes, including safe working practices and risk control measures
- relevant workplace documentation
- relevant workplace policies and procedures
- role of licensed electrician/plumber
- split air conditioning and water heat pump (maximum plant capacity for each system is 18 kW), including:
    - decommissioning split system requirements and procedures installing split systems, including manufacturer instructions, location, mounting and connecting pipe work
    - single head split air conditioning system (up to 18 kW) types, applications, major components, controls, operation and operating conditions
    - split system start-up, including manufacturer instructions, pressure testing, evacuation, checking refrigerant charge, adding refrigerant, leak detection and checking function and performance.
    - split water heating heat pump system (up to 18 kW) types, applications, major components, controls, operation and operating conditions
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0050 Install refrigerant pipe work, flow controls and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install refrigerant piping/tubing, fittings, flow controls and accessories for refrigeration and air conditioning systems in buildings and premises in accordance with relevant regulations, industry standards, codes of practice, manufacturer instructions, and industry and workplace requirements.

It includes working safely; applying industry standards; routing pipe work to specified locations; connecting installations, components and accessories; and documenting work.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation and repair of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit may require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install pipe work, flow controls and accessories	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards which have not previously been identified are noted, assessed and risk control measures implemented in accordance with workplace procedures
	1.3 Pipe work, flow control and accessory installation are sequenced in accordance with workplace procedures and job schedule
	1.4 Work details are determined from documentation and/or supervisor to establish scope of work to be completed
	1.5 Pipe work routes are planned within the constraints of the building structure, including heritage specifications, in accordance with workplace procedures
	1.6 Supervisor is consulted, as required, to ensure work is coordinated with others
	1.7 Materials to install pipe work, flow controls and accessories are obtained and checked against job requirements in accordance with workplace procedures
	1.8 Tools, equipment and testing devices to install pipe work, flow controls and accessories are obtained and checked for operational safety
2 Install pipe work, flow controls and accessories	**2.1** Circuits, machines and plant are checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.2 Pipe work, flow controls and accessories are installed with sufficient access for connections and maintenance in accordance with workplace procedures, industry

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		standards and job specification
	2.3	Pipe work, flow controls and accessories are installed straight and square, in required locations and within acceptable tolerances in accordance with workplace procedures
	2.4	Dry nitrogen is used to prevent contamination while silver brazing refrigerant tubing and fittings in accordance with workplace procedures
	2.5	Problematic situations from installation of pipe work, flow controls and accessories are resolved in accordance with workplace procedures
	2.6	Checks on quality of pipe work, flow controls and accessories are undertaken, including pressure testing and repair of leaks, in accordance with workplace procedures and relevant industry standards
	2.7	Adjustment of settings and replacement of flow controls are undertaken, as required, in accordance with workplace procedures
	2.8	Pipe work, flow controls and accessories are installed without waste of materials, damage or contamination to apparatus, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete pipe work, flow controls and accessories installation	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Final check of installed pipe work is made to verify that it complies with workplace and industry requirements
	3.3	'As-installed' pipe work, flow controls and accessories are documented and supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing refrigerant pipe work, flow controls and accessories must include at least two different types of refrigeration and/or air conditioning systems, including the following:

- pipe work that includes suction lines, liquid lines, discharge lines and control lines
- flow controls that include both liquid and vapour flow controls - mechanical and electronic
- accessories that include pipe work fittings, hand valves, isolation valves, solenoid valves, check valves, reversing valves, filter/dryers, sight glasses, accumulators and oil separators

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ106A Install refrigerant pipe work, flow controls and accessories.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0050 Install refrigerant pipe work, flow controls and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- applying legislation, relevant industry standards, codes of practice and regulations
- applying manufacturer specifications
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards
  - using risk control measures
- completing pipe work, flow controls and accessories installation
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- implementing safe working practices
- installing refrigerant pipe work, flow controls and accessories for refrigeration and air conditioning systems, including:
  - checking operation, adjusting settings and replacement of flow controls
  - preventing pipe work contamination
  - connecting pipe work, flow controls and accessories to comply with requirements
  - ensuring pipe work, flow controls and accessories will not leak under pressure
  - placing and securing flow controls and accessories
  - reading and interpreting drawings related to pipe work layouts and apparatus locations
  - routing, placing and securing pipe work to comply with requirements
- preparing to install pipe work, flow controls and accessories.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- installation of pipe work, flow controls and accessories requirements and practices for

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refrigeration and air conditioning systems, including:

- environmental and building regulation responsibilities, including those of working in and around heritage and environmental protection sites
- operation, replacement and adjustment of refrigerant flow controls
- pressure testing refrigerant pipe work
- refrigerant liquid flow controls and distributors, including capillary, thermostatic expansion valve, thermoelectric expansion valve, electronic expansion valve, low side floats, high side floats and liquid level controllers
- refrigerant pipe work accessories, including pipe work fittings, hand valves, isolation valves, solenoid valves, check valves, reversing valves, filter/dryers, sight glasses, accumulators, oil separators and pressure relief devices
- refrigerant vapour flow controls, including evaporator pressure regulators, crankcase pressure regulators, condenser bypass valves and electronic valves/controllers
- refrigeration pipe work, including appropriate piping arrangements for refrigerant lines, including discharge lines, liquid lines and suction lines

- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - safe working practices
  - potential hazards
  - risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment

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specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0051 Install, commission, service and maintain air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to safely and effectively install, commission, service and maintain air conditioning systems.

It includes the ability to source relevant data and schematics; install components, pipe work, accessories and controls to create a functional air conditioning system. It covers selecting, installing and terminating interconnecting and controller cables between the sensor/s, controller/s, indoor and outdoor units of residential and small commercial systems; replacing damaged cables on equipment operating at voltages up to 500 volt (V) alternating current (a.c.) after its main switch with like-for-like cables; commissioning the system to ensure it operates at the specified design conditions, locating and rectifying faults and carrying out routine maintenance procedures.

The skills and knowledge of this unit of competency will be applied by refrigeration and air conditioning technicians during the installation, commissioning and servicing of air conditioning systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working

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aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install air conditioning systems	**1.1** WHS/OHS risk control measures and procedures for carrying out the work are obtained and implemented in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Components, piping, accessories, controls and consumables for the installation work are obtained and checked against job requirements in accordance with industry standards and codes of practice
	1.4 Tools, equipment and testing devices to complete work are obtained in accordance with workplace procedures and checked for operational safety in accordance with workplace procedures
2 Select, install and terminate low voltage (LV) and extra-low voltage (ELV) cables for refrigeration or air conditioning installations	**2.1** Cable conductor sizes are selected to meet the equipment manufacturer specifications, current-carrying capacity requirements and voltage-drop

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	2.2	Reasons for selections made, including calculations, are documented in accordance with established procedures
	2.3	Cables are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations
	2.4	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
	2.5	Safety inspection of installed cables and testing of installed circuits are undertaken and any defects are rectified
	2.6	'As-installed' cables/wiring are documented and appropriate person/s notified in accordance with established procedures
3 Install non-ducted split air conditioning systems	**3.1**	All required major components are securely mounted in the locations identified by the documentation or the supervisor in accordance with workplace procedures
	3.2	Refrigerant pipe work and associated components are installed according to specifications ensuring all connections and tube cleanliness are in accordance with requirements and workplace procedures
	3.3	Pressure testing of the installed components and pipe work is conducted to the required level for the type of refrigerant being used in accordance relevant codes of practice and industry standards
	3.4	Leaks are located and rectified employing appropriate methods in accordance with relevant codes of practice and industry standards
	3.5	Air conditioning system is evacuated to remove moisture and other contaminates in accordance with relevant codes of practice and industry standards
	3.6	Vacuum drop test is carried out to verify all moisture and other contaminants have been removed from the system in accordance with relevant codes of practice and industry standards
	3.7	Power and control circuit wiring is checked to ensure it conforms to circuit diagram specifications and system is electrically safe to energise in accordance with relevant

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	codes of practice and industry standards
4 Install ducted split air conditioning systems	**4.1** Major components are securely mounted in the locations identified by the documentation or the supervisor in accordance with workplace procedures
	4.2 Flexible ductwork, associated fittings and flow control devices are installed according to specifications ensuring all connections are in accordance with workplace procedures and industry standards
	4.3 Refrigerant pipework and associated components are installed ensuring all connections and tube cleanliness is maintained at all times in accordance with workplace procedures and manufacturer specifications
	4.4 Pressure testing of the installed components and pipe work is conducted to the required level for the type of refrigerant being used in accordance with relevant industry standards and workplace procedures
	4.5 Leaks are located and rectified employing appropriate methods in accordance with industry standards and codes of practices
	4.6 Air conditioning system is evacuated to remove moisture and other contaminates in accordance with industry standards, relevant codes of practices and workplace procedures
	4.7 Vacuum drop test is carried out to verify all moisture and other contaminants have been removed from the system in accordance with industry standards, relevant codes of practices and workplace procedures
	4.8 Power and control circuit wiring is checked to ensure it conforms to circuit diagram specifications and system is electrically safe to energise in accordance with industry standards, relevant codes of practices and workplace procedures
5 Commission air conditioning systems	**5.1** Air conditioning system is charged with the appropriate type and quantity of refrigerant in accordance with industry standards, relevant codes of practices and workplace procedures
	5.2 Measurements are obtained and recorded to confirm that the refrigerant charge is optimal in accordance with the system's design and manufacturer specifications

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	5.3	Control devices installed in the air stream for air flow quantity and distribution control are adjusted in accordance with the system's design and manufacturer specifications
	5.4	Measurements are obtained and recorded to confirm that air flow quantities and distribution is optimal in accordance with the system's design and manufacturer specifications
6 Locate and rectify faults and carry out maintenance on air conditioning systems	**6.1**	Fault diagnosis is carried out in accordance with industry standards, relevant codes of practices and workplace procedures
	6.2	Fault-finding and rectification processes are carried out effectively without damage to the system and components in accordance with relevant codes of practice, industry standards and workplace procedures
	6.3	System is returned to an operational state in accordance with workplace procedures and manufacturer specifications
	6.4	Components that require routine maintenance are identified and regularly maintained in accordance with relevant timeframes, industry standards and workplace procedures
7 Complete work and report activities	**7.1**	WHS/OHS risk control measures continue to be applied in accordance with workplace procedures
	7.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	7.3	Refrigerant usage is recorded in accordance with relevant industry regulations and codes of practice
	7.4	Supervisor is notified of task completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting, installing and terminating LV and ELV cables for air conditioning installations must include the following applications:	• interconnecting and controller cables between the sensor/s, controller/s, indoor and outdoor units of residential and small commercial air conditioning systems • replacing damaged cables on air conditioning equipment operating at voltages up to 500 V a.c. after its main switch with like-for-like cables
Selecting, installing and terminating LV and ELV cables for air conditioning installations must include the following cable types:	• circular thermoplastic sheathed (TPS) • data cables • flat TPS • flexible cables • shielded cables • thermoplastic insulated (TPI) cable
Installing, commissioning, servicing and maintaining split air conditioning systems must include at least one of the following:	• high wall split air conditioning system • ceiling cassette split air conditioning system • ceiling suspended split air conditioning system
Installing, commissioning, servicing and maintaining ducted air conditioning systems must include at least one of the following:	• ducted split air conditioning system • ducted package air conditioning system
Electrical supply to the installed air conditioning system must include one of the following:	• single phase 240 V • three phase 415 V
Fault finding and rectification of an air conditioning system must include at least two of the following mechanical faults:	• incorrect refrigerant charge • restriction within refrigerant circuit, including filter drier and refrigerant metering device (RMD) • non-condensables • incorrect low side superheat • incorrect high side sub-cooling • component failure, including compressor not pumping
Fault finding and rectification of an air conditioning system must include at least two of the following electrical faults:	• open circuit, including load, conductor and/or control • incorrect circuit wiring

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	• earthing short, including load circuit has connected with casing and/or frame • shunted short, including load is internally shorted causing lower resistance • incorrect phase rotation
Carrying out maintenance on air conditioning systems must include all of the following	• high wall split air conditioning system • ducted split air conditioning system • ducted package unit air conditioning system

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0051 Install, commission, service and maintain air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- commissioning a ducted air conditioning system
- installing a ducted split air conditioning system
- installing a non-ducted split air conditioning system
- locating and rectifying mechanical faults and electrical faults on air conditioning systems
- maintaining air conditioning systems
- recording values and reporting completion of work
- selecting, installing and terminate low voltage (LV) and extra-low voltage (ELV) cables for refrigeration or air conditioning installations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- air distribution, including:
  - air control damper types and applications
  - common fan types and applications
  - duct fitting types and applications
  - noise and vibration control methods
  - purpose of zoning, including advantages and disadvantages
  - relevant legislation, industry standards, codes of practice and regulations
  - rigid and flexible duct types and applications
  - supply and return air diffuser/grille types and applications
- basic ducted split system selection for a residential application, including:
  - application of industry recognised check figures watts per square metre (W/m^2) and

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manufacturers data
    - basic ductwork dimensioning employing a duct calculator
    - drawing a basic ductwork layout map
    - manufacturers design specifications and effects of operating the air conditioning system outside these conditions, including high/low ambient temperature and high relative humidity
- cable selection based on the existing cable, current-carrying capacity requirements, including:
    - *AS/NZS 3008 Electrical installations – Selection of cables – Cables for alternating voltages up to and including 0.6/1 kV* used to select conductor size based on the maximum current requirement for a given installation condition, including any applicable derating factors
    - types of cables and applications
- cable selection based on voltage-drop requirements, including:
    - *AS/NZS 3000* requirements for maximum voltage-drop in an installation
    - calculation of the expected voltage-drop in a given circuit
    - relevant tables in *AS/NZS 3008 Electrical installations – Selection of cables – Cables for alternating voltages up to and including 0.6/1 kV* for unit values of voltage-drop
    - selecting cables to satisfy voltage drop requirements in addition to current-carrying capacity requirements
- commissioning air conditioning systems requirements and procedures, including:
    - basic air balancing techniques
    - techniques to determine operating values for a reverse cycle high wall split air conditioning system
- common items identified on a preventative maintenance schedule, including the following air conditioning system types:
    - high wall splits
    - package units
    - split ducted
- defrost (de-ice) operation, including activation and termination conditions
- equipment installation requirements and procedures, including:
    - location considerations for outdoor and indoor units, including exposure, prevailing winds and noise regulations
    - maintaining structural integrity, including weight being applied and cutting of trusses/beams
    - maintenance of fire rating integrity
    - reading and interpreting manufacturer instructions
    - relevant legislation, industry standards, codes of practice and regulations
    - requirements for condensate removal and/or drainage
- fault finding and rectification of air conditioning systems requirements and procedures, including:
    - typical controller fault codes and use of manufacturer’s data
    - symptoms and rectification of typical abnormal system conditions:

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        - defrost initiation or termination failure
        - earthing short, including load circuit has connected with casing and/or frame
        - high side sub-cooling too low/too high
        - incorrect phase rotation and scroll compressors
        - inefficient compressor, including reduced pumping capacity
        - inverter failure, including manufacturers recommended testing procedure
        - low side superheat too low/too high
        - non-condensables
        - open circuit
        - refrigerant overcharge and undercharge
        - restricted filter drier
        - shunted short, including load is internally shorted causing lower resistance
- package units, including construction, applications and installation
- reading and interpreting single phase wiring and pipe work schematics for a typical cooling only room air conditioner
- reading and interpreting single phase wiring and pipe work schematics for a typical reverse cycle high wall split air conditioner
- reading and interpreting three phase wiring and pipe work schematics for a typical reverse cycle package unit
- relevant standards, codes and requirements applicable to the installation of cables
- techniques for installing cables and wiring systems encompassing:
    - application of wiring accessories
    - cable and conductor terminations
    - drawing-in, placing and fixing of cables
    - inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply
    - maintaining fire rating integrity
    - typical cable routes through buildings, structures and premises
- ventilation, including:
    - fresh air requirements in accordance with relevant industry standards
    - common methods, including natural, supply and exhaust
    - relevant legislation, industry standards, codes of practice and regulations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0052 Install, commission, service and maintain low temperature systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to safely and effectively install, commission, service and maintain low temperature cabinets and freezer rooms employing a single evaporator and single condensing unit.

It includes the ability to source relevant data and schematics; install components, pipe work, accessories and controls to create a functional low temperature system; commission the system to ensure it operates at the specified design conditions; locate and rectify faults; and carry out routine maintenance procedures.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation, commissioning and servicing of low temperature refrigeration systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install low temperature cabinet or freezer room systems	**1.1** WHS/OHS risk control measures and procedures for carrying out the work are obtained and implemented in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Components, piping, accessories, controls and consumables for the installation work are obtained and checked against job requirements in accordance with industry standards and codes of practice
	1.4 Tools, equipment and testing devices to complete work are obtained in accordance with workplace procedures and checked for operational safety in accordance with workplace procedures
2 Install low temperature cabinet or freezer room systems	**2.1** Major components are securely mounted in the locations identified by the documentation or supervisor in accordance with workplace procedures
	2.2 Refrigerant pipe work and associated components are installed according to specifications ensuring all connections and tube cleanliness are in accordance with job requirements and workplace procedures

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	2.3	Pressure testing of the installed components and pipe work is conducted to the required level for the type of refrigerant being used in accordance with relevant codes of practice and industry standards
	2.4	Leaks are located and rectified employing appropriate methods in accordance with relevant codes of practice and industry standards
	2.5	Refrigeration system is evacuated to remove moisture and other contaminates in accordance with relevant codes of practice and industry standards
	2.6	Vacuum drop test is carried out to verify all moisture and other contaminants have been removed from the system in accordance with relevant codes of practice and industry standards
	2.7	Power and control circuit wiring is checked to ensure it conforms to circuit diagram specifications and system is electrically safe to energise in accordance with relevant codes of practice and industry standards
3 Commission low temperature cabinet or freezer room systems	**3.1**	Refrigeration system is charged with the appropriate type and quantity of refrigerant in accordance with relevant codes of practice, industry standards and manufacturer specifications
	3.2	Operation of the refrigerant metering device is adjusted as necessary to ensure low side superheat in accordance with industry standards, codes of practice and/or workplace documentation or supervisor
	3.3	Safety and cycling controls are adjusted to ensure the operational values are in safe and efficient operation in accordance with codes of practice and/or workplace documentation or supervisor
	3.4	Measurements are obtained and recorded to confirm that the refrigerant charge is optimal and the system is operating within specified parameters in accordance with relevant codes of practice and industry standards
4 Locate and rectify faults and carry out maintenance on low temperature cabinet or freezer room systems	**4.1**	Fault diagnosis is carried out in a logical and effective manner in accordance with relevant codes of practice, industry standards and workplace procedures

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	4.2	Fault-finding and rectification processes are carried out effectively without damage to the system and components and in accordance with relevant codes of practice, industry standards and workplace procedures
	4.3	System is returned to an operational state in accordance with workplace procedures and manufacturer specifications
	4.4	Components that require routine maintenance are identified and regularly maintained in accordance with relevant timeframes, industry standards and workplace procedures
5 Complete work and report activities	**5.1**	WHS/OHS risk control measures continue to be applied in accordance with workplace procedures
	5.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	5.3	Refrigerant usage is recorded in accordance with relevant industry regulations and codes of practice
	5.4	Supervisor is notified of task completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, commissioning, servicing and maintaining low temperature cabinets and freezer rooms must include one of the following:	• low temperature refrigerated freezer room with a single evaporator • low temperature upright or under-bar refrigerated cabinet with a single evaporator
Condensing unit employed on low temperature refrigeration system must include one of the	• directly mounted single condensing unit • remotely mounted single condensing unit

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following:

Refrigerant metering device employed on low temperature refrigeration systems must include one of the following:	• electronic expansion valve • externally equalised thermostatic expansion valve • internally equalised thermostatic expansion valve
Electrical supply to the installed low temperature refrigeration systems must include one of the following:	• single phase 240 V • three phase 415 V
Fault finding and rectification of low temperature refrigeration systems must include at least two of the following mechanical faults:	• component failure, including compressor not pumping • incorrect control setting • incorrect high side sub-cooling • incorrect low side superheat • incorrect refrigerant charge • non-condensables • restriction within refrigerant circuit, including filter drier and refrigerant metering device (RMD)
Fault finding and rectification of low temperature refrigeration systems must include at least two of the following electrical faults:	• earthing short, including load circuit has connected with casing or frame • incorrect circuit wiring • open circuit, including load, conductor or control • shunted short, including load is internally shorted causing lower resistance

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0052 Install, commission, service and maintain low temperature systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying relevant requirements, legislation, standards, codes of practice and industry procedures
- commissioning a low temperature system
- installing a low temperature system
- locating and rectifying mechanical faults and electrical faults on a low temperature cabinet or freezer room system
- maintaining a low temperature cabinet or freezer room system
- recording values and reporting completion of work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- freezer room protection components encompassing purpose of implosion ports and floor, door and drain heaters
- common items identified on a preventative maintenance schedule for a low temperature cabinet and freezer room
- commissioning typical general-purpose low temperature refrigeration systems requirements and procedures, including:
  - techniques to determine operating values of a low temperature system
  - techniques to determine operating values of a cycling and safety control settings for a low temperature system
  - typical initiation and termination settings for electric element and hot gas defrost methods
- definition and purpose of hazard analysis and critical control points (HACCP)
- defrost methods, including electric element and hot gas defrost employing a time initiated

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and pressure or temperature terminated control
- fault finding and rectification of low temperature systems requirements and procedures, including:
  - symptoms and rectification of typical abnormal system conditions:
    - defrost initiation or termination failure
    - earthing short, including load circuit has connected with casing and/or frame
    - high side sub-cooling too low/too high
    - inefficient compressor
    - low side superheat too low/too high
    - non-condensables
    - open circuit
    - refrigerant overcharge and undercharge
    - restricted air flow through condenser
    - restricted air flow through evaporator
    - restricted filter drier/thermostatic expansion valve (TEV) strainer
    - shunted short, including load is internally shorted causing lower resistance
  - typical controller fault codes and use of manufacturers' data
- low temperature display cabinet types, construction and applications, including solid door cabinets, glass door displays and under-bars
- low temperature freezer rooms, including construction and ancillary fittings
- low temperature merchandiser types, construction and applications, including island and reach-in
- reading and interpreting single phase wiring and pipe work schematics for a typical low temperature cabinet or freezer room employing electric element or hot gas defrost
- reading and interpreting three phase wiring schematics for a typical low temperature freezer room employing electric element or hot gas defrost
- requirements for condensate removal/drainage
- typical range of products stored in low temperature cabinets/freezer rooms and required storage conditions, including frozen food and ice cream products
- refrigeration equipment installation requirements and procedures, including:
  - maintenance of fire rating integrity
  - relevant legislation, industry standards, codes of practice and regulations
  - self-contained and remote installations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0053 Install, commission, service and maintain medium temperature systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to safely and effectively install, commission, service and maintain medium temperature cabinets and cool rooms employing a single evaporator and single condensing unit. It includes the ability to source relevant data and schematics; install components, pipe work, accessories and controls to create a functional medium temperature system; commission the system to ensure it operates at the specified design conditions; locate and rectify faults; and carry out routine maintenance procedures.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation, commissioning and servicing of medium temperature refrigeration systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install medium temperature cabinet or cool room systems	**1.1** WHS/OHS risk control measures and procedures for carrying out the work are obtained and implemented in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Components, piping, accessories, controls and consumables for the installation work are obtained and checked against job requirements in accordance with industry standards and codes of practice
	1.4 Tools, equipment and testing devices to complete work are obtained in accordance with workplace procedures and checked for operational safety in accordance with workplace procedures
2 Install medium temperature cabinet or cool room systems	**2.1** Major components are securely mounted in the locations identified by the documentation or supervisor in accordance with workplace procedures
	2.2 Refrigerant pipe work and associated components are installed according to specifications ensuring all connections and tube cleanliness are in accordance with job requirements and workplace procedures

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	2.3	Pressure testing of the installed components and pipe work is conducted to the required level for the type of refrigerant being used in accordance with relevant codes of practice and industry standards
	2.4	Leaks are located and rectified employing appropriate methods in accordance with relevant codes of practice and industry standards
	2.5	Refrigeration system is evacuated to remove moisture and other contaminates in accordance with relevant codes of practice and industry standards
	2.6	Vacuum drop test is carried out to verify all moisture and other contaminants have been removed from the system in accordance with relevant codes of practice and industry standards
	2.7	Power and control circuit wiring is checked to ensure it conforms to circuit diagram specifications and system is electrically safe to energise in accordance with relevant codes of practice and industry standards.
3 Commission medium temperature cabinet or cool room systems	**3.1**	Refrigeration system is charged with the appropriate type and quantity of refrigerant in accordance with relevant codes of practice, industry standards and manufacturer specifications
	3.2	Operation of the refrigerant metering device is adjusted, as necessary, to ensure operating low side superheat is in accordance with industry standards, codes of practice and/or workplace documentation or supervisor
	3.3	Safety and cycling controls are adjusted to ensure the operational values are in safe and efficient operation in accordance with codes of practice and/or workplace documentation or supervisor
	3.4	Measurements are obtained and recorded to confirm that the refrigerant charge is optimal and the system is operating within specified parameters in accordance with codes of practice and industry standards
4 Locate and rectify faults and carry out maintenance on medium temperature cabinet or cool room systems	**4.1**	Fault diagnosis is carried out in a logical and effective manner in accordance with relevant codes of practice, industry standards and workplace procedures

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	4.2	Fault-finding and rectification processes are carried out effectively without damage to the system and components in accordance with relevant codes of practice, industry standards and workplace procedures
	4.3	System is returned to an operational state in accordance with workplace procedures and manufacturer specifications
	4.4	Components that require routine maintenance are identified and regularly maintained in accordance with relevant timeframes, industry standards and workplace procedures
5 Complete work and report activities	**5.1**	WHS/OHS risk control measures continue to be applied in accordance with workplace procedures
	5.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	5.3	Refrigerant usage is recorded in accordance with relevant industry regulations and codes of practices
	5.4	Supervisor is notified of task completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Installing, commissioning, servicing and maintaining medium temperature cabinets and cool rooms must include one of the following:	• medium temperature upright or under-bar refrigerated cabinet with a single evaporator • medium temperature refrigerated cool room with a single evaporator
Condensing unit employed must include one of	• directly mounted single condensing unit • remotely mounted single condensing unit

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the following:

Refrigerant metering device employed must include one of the following:	• electronic expansion valve • externally equalised thermostatic expansion valve • internally equalised thermostatic expansion valve
Electrical supply to the installed medium temperature refrigeration systems must include one of the following:	• single phase 240 V • three phase 415 V
Fault finding and rectification of medium temperature refrigeration systems must include at least two of the following mechanical faults:	• component failure, including compressor not pumping • incorrect control setting • incorrect high side sub-cooling • incorrect low side superheat • incorrect refrigerant charge • non-condensables • restriction within refrigerant circuit, including filter drier and refrigerant metering device (RMD)
Fault finding and rectification of medium temperature refrigeration systems must include at least two of the following electrical faults:	• earthing short, including load circuit has connected with casing or frame • incorrect circuit wiring • open circuit, including load, conductor and/or control • shunted short, including load is internally shorted causing lower resistance

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0053 Install, commission, service and maintain medium temperature systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying relevant requirements, legislation, standards, codes of practice and industry procedures
- commissioning a medium temperature refrigeration system
- installing a medium temperature refrigeration system
- locating and rectifying mechanical faults and electrical faults on a medium temperature cabinet or cool room system
- maintaining a medium temperature cabinet or cool room system
- recording values and reporting completion of work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commissioning typical general-purpose medium temperature refrigeration system requirements and procedures, including:
  - techniques to determine operating values for a medium temperature system operating with a 2°C product
  - typical cycling and safety control settings for a 2°C product temperature, 6K evaporator td
  - typical cycling and safety control settings for a 2°C product temperature, 6K evaporator td
  - typical initiation and termination settings for forced off-cycle defrost method
- common items identified on a preventative maintenance schedule for a medium temperature cabinet or cool room
- definition and purpose of hazard analysis and critical control points (HACCP)

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- defrost methods, including natural off-cycle defrost and forced off-cycle defrost employing a time initiated and time terminated control
- fault finding and rectification of medium temperature systems requirements and procedures, including:
  - symptoms and rectification of typical abnormal system conditions:
    - earthing short (load circuit has connected with casing or frame)
    - high side sub-cooling too low/too high
    - inefficient compressor
    - low side superheat too low/too high
    - non-condensables
    - open circuit
    - refrigerant overcharge and undercharge
    - restricted air flow through condenser
    - restricted air flow through evaporator
    - restricted filter drier/thermostatic expansion valve (TEV) strainer
    - shunted short, including load is internally shorted causing lower resistance
  - typical controller fault codes and use of manufacturers data
- medium temperature cool rooms, including construction and ancillary fittings
- medium temperature display cabinet types, construction and applications, including solid door cabinets, glass door displays, countertops, under-bars and open decks
- medium temperature merchandiser types, construction and applications, including single deck, multi-deck, island, reach-in and serviced
- off-cycle pump-down, including thermostat controlling liquid line solenoid valve purpose and components required
- range of products stored in medium temperature cabinets and cool rooms and required storage conditions, including fresh meat, dairy, delicatessen, mixed drinks, fruit and vegetables
- reading and interpreting single phase wiring and pipe work schematics for a typical medium temperature cabinet or cool room incorporating basic off-cycle, including thermostat controlling compressor
- reading and interpreting single phase wiring and pipe work schematics for a typical medium temperature cabinet or cool room incorporating off-cycle pump-down, including thermostat controlling liquid line solenoid valve
- reading and interpreting three phase wiring schematics for a typical medium temperature cool room incorporating off-cycle pump-down, including thermostat controlling liquid line solenoid valve
- refrigeration equipment installation requirements and procedures, including:
  - maintenance of fire rating integrity
  - relevant legislation, industry standards, codes of practice and regulations
  - self-contained and remote installations
- requirements for condensate removal/drainage.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0054 Maintain microbial control of refrigeration and air conditioning systems

Modification History

Release 1: This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain microbial control of refrigeration and air conditioning systems.

It includes quality assurance and risk management compliance processes for maintenance of the air and water systems associated with refrigeration and air conditioning.

It also includes working safely and to technical, quality and risk management industry standards, work specifications, maintenance schedules and sample inspections; evaluating components and completing the necessary maintenance documentation.

The skills and knowledge in this unit will be applied by those cleaning and maintaining refrigeration and air conditioning chilled water, hot water or cooling tower water systems.

Most state/territory jurisdictions have legislative requirements for the management of microbial control in cooling water systems to prevent the growth and transmission of Legionnaires' Disease.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

Not applicable.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain microbial control of air and water systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards which have not been previously identified are noted on risk assessment documents and risk control measures determined and implemented
	1.3 Maintenance schedule and process compliance requirements are confirmed and appropriately sequenced in accordance with legislative, industry standards and code requirements and established procedures
	1.4 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5 Location of equipment to be maintained is determined from maintenance schedule, workplace procedures and/or system specifications and diagrams
	1.6 Resources needed to conduct the maintenance are obtained in accordance with workplace procedures and checked against job requirements
	1.7 Tools, equipment and testing devices needed to conduct the maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Maintain microbial control of air and water systems	**2.1** Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Water samples are taken and tested in accordance with legislative, industry standards and code requirements and established methods and routines
	2.3 Air and water system apparatus to be maintained is inspected and evaluated for compliance with legislative, industry standards and code requirements in accordance

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		with maintenance schedule.
	2.4	Non-compliant apparatus/components/samples are documented and arrangements made for their rectification in accordance with workplace procedures
	2.5	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Ongoing checks of quality of maintenance work are undertaken in accordance with workplace procedures
	2.7	Maintenance process compliance is performed efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete maintenance processes and documentation	**3.1**	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.2	Final checks are made to verify that the maintenance complies with maintenance requirements
	3.3	Maintenance completion is documented and appropriate person/s notified in accordance with established procedures and regulations

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

maintaining microbial control of refrigeration and air conditioning systems must include at least the following:	• two different air and water systems

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ168A Maintain microbial control of refrigeration and air conditioning systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0054 Maintain microbial control of refrigeration and air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislative, industry standards, codes and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining and arranging for corrective action of non-compliant apparatus
- documenting maintenance work
- following maintenance schedule
- following quality assurance and risk management compliance processes
- inspecting and evaluating apparatus for quality assurance and risk compliance
- interpreting maintenance schedule requirements correctly
- planning to maintain microbial control of air and water system
- sampling water condition.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- harmful microbes and the effects if left uncontrolled
- maintenance microbial control of refrigeration and air conditioning system, including:
  - data acquisition
  - inspection techniques
  - maintenance plans
  - plant history cards/files
  - predictive maintenance

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  - principles and function
  - recording methods
  - systems and terminology
- methods of controlling harmful microbes, including regular cleaning/decontamination of effected plant, sample testing and approved treatment
- microbial control safe working practices and relevant industry standards, codes of practice and regulations
- relevant air and water system manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes, including safe handling and application of treatment materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- types of air and water systems that require control of harmful microbes.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0055 Manage refrigeration and air conditioning projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage refrigeration and air conditioning projects.

It includes the management of safety, budget, variations, personnel, resources and critical path timelines and all necessary progress and completion documentation.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work.

Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Determine the scope of the project**	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
		1.2 Project deliverables and budget are determined from project planning and relevant documentation and/or discussions with relevant person/s
		1.3 Measurable outcomes are identified to evaluate project on completion from project planning and relevant documentation in accordance with contractual agreement
		1.4 Plant, materials and skills required to meet project outcomes are determined from project planning and relevant documentation in accordance with contractual agreement
		1.5 Workplace procedures are developed for managing contract variations from discussions with relevant person/s in accordance with contractual agreement
2	**Manage project**	**2.1** WHS/OHS requirements and procedures are implemented and monitored
		2.2 Achievement of project outcomes is assigned to relevant person/s involved in the project
		2.3 Project risks are identified and project plan strategies implemented to ensure outcomes are achieved in accordance with relevant industry standards, WHS/OHS requirements, contractual agreement and workplace procedures
		2.4 Procurement processes, timelines and supply of plant and materials are monitored in accordance with workplace procedures
		2.5 Project progress is monitored in accordance with schedule, quality requirements and budget
		2.6 Conflict issues at worksite between stakeholders, clients and regulators are identified and managed in accordance with workplace procedures
		2.7 Variations are managed in accordance with workplace procedures and contractual agreement
		2.8 Project records are maintained and forwarded to relevant person/s

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3	**Complete project**	**3.1** Project outcomes, implemented risk strategies, contract variations, safety record and budget are reviewed in accordance with contractual agreement
		3.2 Project completion acceptance is sought from relevant person/s and handover documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Managing a refrigeration and air conditioning project must include the following:

- an industry accepted medium-sized refrigeration or air conditioning project

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ040B Manage refrigeration and air conditioning projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0055 Manage refrigeration and air conditioning projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope of the project accurately
- ascertaining the input to a project
- developing effective management processes
- managing resources and variations effectively
- resolving conflicts
- adopting risk management strategies
- maintaining records and submitting progress reports
- meeting project outcomes
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- completing projects
- managing projects.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigeration and air conditioning project management methods and techniques, safe working practices and relevant standards, codes and regulations, including:
  - defining project parameters, including:
    - project scope; project stakeholders and clients; project phases and the relationship between phases; time requirements and limitations; resource requirements and limitations; quality requirements and limitations
  - time management, including:
    - time management concepts and standard practices for ensuring a project runs to time
  - financial management, including:

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        - financial management concepts; standard practices for managing project finances; project budgets; costs, variations and estimations; invoicing against project phases/deliverables and acquittals
    - quality management, including:
        - quality management concepts; standard practices for managing quality within a project
    - human resource management, including:
        - human resource management concepts and standard practices for managing personnel within a project
    - communication management, including:
        - communication management concepts and standard practices for managing communication within a project
    - risk management and contingencies, including:
        - risk management concepts; standard practices for managing risk within a project; internal risks; external risks; risk minimisation; risk removal and contingencies
    - procurement management, including:
        - procurement management concepts and standard practices for managing procurement
    - physical resource management, including:
        - types of physical resource, including equipment, technology, information, facilities; physical resource management concepts and standard practices for managing physical resources
    - contracts, including:
        - understanding project contracts; standard practices for working to contract specifications; contract format; contract content; legal obligations of contract parties; and accompanying documentation, including contract schedules
    - performance assessment and continuous improvement, including:
        - standard performance assessment practices and standard continuous improvement practices
    - engineering ethics principles
    - customer/client relations, including:
        - importance of customer/client relations
        - interpersonal skills that enhance customer/client
        - dispute resolution
        - customer/client relations strategies
- refrigeration and air conditioning industry sector customs and practices, including:
    - technical aspects of project planning and management encompassing:
        - method of ensuring equipment meets specified performance requirements
        - performance/cost-benefit analysis
        - equipment procurement
    - typical approaches to planning and management
    - successful planning techniques

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  - best practice management methods and styles
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0056 Monitor and adjust refrigeration energy management systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to monitor and adjust refrigeration energy management systems.

It includes setting up and adjusting energy management systems on refrigeration systems for effective energy use. It also includes working safely, testing and analysing system parameters, adjusting equipment and controls, following workplace procedures, and documenting final operating parameters and settings.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

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UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to monitor and adjust energy management systems on refrigeration system	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for refrigeration system work
	1.3 Safety hazards not previously identified are noted on job safety assessment and established risk control measures

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		implemented
	1.4	Appropriate person/s is consulted to ensure refrigeration system work is coordinated effectively with others involved on the worksite
	1.5	Refrigeration system energy parameters are identified by reviewing system specifications and component technical data
	1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety
	1.7	Preparatory work is checked to ensure no damage has occurred and complies with job requirements
	1.8	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and workplace safety procedures
	1.9	Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
2 Monitor and adjust energy management systems on refrigeration system	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out refrigeration system work are followed
	2.2	Testing/measuring devices are connected and set up in accordance with job requirements and refrigeration system
	2.3	Monitoring and adjustments are made to equipment components and controls to provide effective energy use in accordance with refrigeration system specifications and regulatory requirements
	2.4	Unplanned situations are responded to in accordance with workplace procedures, discussions with appropriate person/s and job specifications and requirements in a manner that minimises risk to personnel and equipment
	2.5	Refrigeration system monitoring and adjusting is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy principles
3 Complete and report monitoring adjusting	**3.1**	WHS/OHS risk control work completion measures and

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activities		workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Monitoring and adjustment settings are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Monitoring and adjusting refrigeration and energy management systems must include at least the following:

- two different types of energy management systems for refrigeration systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ121A Monitor and adjust refrigeration energy management systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0056 Monitor and adjust refrigeration energy management systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying system energy parameters
- monitoring and adjusting system components and controls to provide effective energy use
- ensuring system energy use is accordance with requirements
- documenting adjustment settings with established procedures
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) workplace procedures and practices requirements, including using risk control measures
- applying sustainable energy principles and practices
- monitoring and adjusting energy management systems on refrigeration system
- planning, monitoring and adjusting energy management systems on refrigeration system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- energy management systems for commercial refrigeration, safe working practices and relevant standards, codes and regulations, including:
  - functions of a commercial refrigeration energy management system, including:
    - general control function
    - inputs
    - outputs
    - communications
    - graphing
    - supervising
    - data logging
    - scheduling

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    - alarms
    - power consumption
- energy management system control components, including:
    - identify components
    - pressure sensors
    - temperature sensors
    - time clocks
    - humidity sensors
    - liquid level sensors
    - leak detector sensor
    - function and operating parameters of components
    - pressure sensors
    - temperature sensors
    - time clocks
    - humidity sensors
    - liquid level sensors
    - leak detector sensors
- installation requirements and considerations, including:
    - installation of controller(s)
    - installation of refrigerant leak detector
    - systems
    - installation of accessory boards
    - installation of pressure transducers and wiring
    - installation of temperature sensors and wiring
    - control wiring considerations
- system design and applications, including:
    - control components to suit given applications
    - system operating parameters
    - pressure sensors
    - temperature sensors
    - time clocks
    - humidity sensors
    - liquid level sensors
    - leak detector sensors
    - defrost
    - alarm panel
- programming a control system, including:
    - display terminal and keypad functions
    - calibration of sensors

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    - changing original settings
    - program a given set of parameters to suit an application
- component testing and fault finding, including:
    - troubleshooting
    - testing of components
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0057 Operate ammonia refrigeration plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to operate ammonia (R717) refrigerant refrigeration plants.

It includes operating an industrial refrigeration plant using ammonia as the refrigerant. It also includes applying specialised refrigeration principles that apply to ammonia, specifying the normal operating parameters for the plant, rectifying faults and defective components within organisational guidelines, and completing the necessary service documentation.

The skills and knowledge in this unit will be applied by ammonia refrigeration plant operators during the start-up, operation and shutdown of ammonia refrigeration plants.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to operate ammonia refrigerant plant	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Ammonia refrigerant, refrigeration system and components on which the work is to be carried out are identified
	1.3 WHS/OHS risk control measures, safety data sheets (SDS)/material safety data sheets (MSDS) and workplace procedures are followed in preparation for refrigeration work
	1.4 Safety hazards not previously identified are reported and advice on risk control measures is sought from work supervisor
	1.5 Nature of work is obtained from documentation or work supervisor to determine the scope of work to be undertaken
	1.6 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.7 Sources of materials required for refrigeration work are accessed in accordance with workplace procedures
	1.8 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
	1.9 Refrigeration system operating conditions are established from service documentation, supervisor and the application of refrigeration fundamentals
2 Operate ammonia refrigeration plant	**2.1** Refrigeration plant is started up in accordance with workplace procedures, industry standards, codes of

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		practice and regulations
	2.2	Measurement of refrigeration system operating parameters is conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.3	Supervisor or person in charge is advised of system and components performing outside their operating parameters to facilitate remedial action
	2.4	Refrigeration plant remedial action is determined and implemented, as required, in accordance with workplace procedures
	2.5	Refrigeration service procedures are completed in accordance with workplace procedures
	2.6	Daily processing requirements are calculated to predict demand on refrigeration plant
	2.7	Oral and written information on the performance of the refrigeration plant is exchanged formally and informally between the operator and supervisor/production team
	2.8	Equipment controls are adjusted to prepare refrigeration plant to meet the load
	2.9	Action is taken in a proactive way to maintain the performance of the plant
	2.10	Demands on plant consumables are calculated to facilitate the ordering of replacements
	2.11	Strategies are developed to meet demand in the event of refrigeration plant equipment malfunction or breakdown
3 Complete work and report on ammonia refrigeration plant operations	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Refrigeration plant performance records are maintained and distributed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Operating ammonia refrigeration system conditions must include at least the following:

- starting up
- determining operating conditions using measurement and calculation methods
- repairing components
- shutting down the system
- checking:
  - suction
  - inter-stage and discharge pressures
  - ambient, evaporator, inter-stage and condensing temperatures
  - evaporator and condenser temperature differences

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ196A Operate Ammonia Refrigeration Plant.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0057 Operate ammonia refrigeration plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislative, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing necessary service documentation
- conducting servicing procedures in accordance with the schedule
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining plant operating condition, rectifying faults and defective components in accordance within workplace procedures and guidelines
- documenting operating conditions correctly
- identifying anhydrous ammonia (R717) refrigerant safety data sheets (SDS)/material safety data sheets (MSDS) and workplace emergency response procedures
- identifying the conditions of the refrigerant at various locations in the vapour compression and liquid recirculation system
- operating an industrial refrigeration plant using ammonia as the refrigerant
- recording measurements
- selecting and using appropriate measuring devices correctly
- shutting down ammonia refrigerant plant
- starting up ammonia refrigerant plant
- taking remedial action within workplace emergency response procedures and job role
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- adding refrigerant, draining/adding oil and purging non-condensables
- ammonia refrigeration system operation
- hazardous goods, segregation, storage and handling
- refrigeration plant start-up, shutdown and emergency procedures
- refrigeration systems, including:
  - ammonia refrigeration system types, operating principles, major components, flow controls and ancillary components
  - operating conditions of ammonia refrigeration systems
- refrigeration vapour compression system principles, including:
  - heat, heat energy (definition and unit of measurement), enthalpy (definition and unit of measurement) and heat transfer
  - pressure, scale types (imperial, metric and absolute) and their units of measurement, vacuum scales (Pascals and microns), and conversion to/from absolute values and gas laws (Boyles, Charles and Daltons)
  - refrigerant conditions, saturation temperature, saturated liquid saturated vapour, superheated vapour, sub-cooled liquid and pressure temperature relationships
  - sensible and latent heat, definition of latent heat and sensible heat (including units of measurement) and measurement devices
  - temperature and relative humidity, scale types (imperial, metric and absolute) and units of measurement and measurement devices
  - vapour compression cycle, primary system components, and high and low pressure sides
- relevant job safety assessments or risk mitigation processes, including ammonia (R717) refrigerant SDS/MSDS
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures, including workplace emergency response plan
- vapour compression system, including operation and major components.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, emergency response plan, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0058 Plan refrigeration and air conditioning projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan refrigeration and air conditioning projects.

It includes establishing budgets, applying critical path analysis, developing workflow strategies, and presenting and negotiating budgets and timelines.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work.

Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to plan project**	**1.1**	WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied
		1.2	Techniques for project planning are reviewed and adopted in accordance with workplace procedures
		1.3	Project is determined from design brief specifications and/or relevant documentation and discussions with relevant person/s
2	**Develop project plan proposal**	**2.1**	Plant, material, labour and relevant costs are sought and obtained from relevant person/s in accordance with workplace procedures
		2.2	Project budget is determined from estimated plant, material, labour and relevant costs in accordance with workplace procedures
		2.3	Critical path analysis is applied to developing workflow strategies
		2.4	Sources and availability of materials and human resources required for project are determined in accordance with workplace procedures
		2.5	Risk management strategies are sought, obtained and incorporated in project plan
		2.6	Project plan is reviewed and adjusted to rectify any anomalies in accordance with project plan
		2.7	Project plan proposal is documented in accordance with workplace procedures
3	**Obtain approval for project plan**	**3.1**	Project plan is presented and discussed with relevant person/s
		3.2	Alterations to the project plan resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final project plan is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Planning refrigeration and air conditioning projects must include the following:

- an industry accepted medium-sized refrigeration or air conditioning project

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ069B Plan refrigeration and air conditioning projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0058 Plan refrigeration and air conditioning projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the project requirements accurately
- establishing a project budget
- developing effective workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan successfully
- obtaining approval of the final plan
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigeration and air conditioning project planning, developing and documenting refrigeration and air conditioning project proposals, milestones and completion methods and techniques, including:
  - purpose of project planning
  - documents needed to plan a project
  - factors influencing sequence and restraints of project activities
  - critical path and project analysis encompassing:
    - purpose
    - essential data
    - relational sequence of work activities
    - graphical representation methods
    - methods of representing time/rates

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    - monitoring methods
  - refrigeration and air conditioning industry sector customs and practices, safe working practices and relevant standards, codes and regulations
- technical aspects of project planning and management encompassing:
    - method of ensuring equipment meets specified performance requirements
    - performance/cost-benefit analysis
    - equipment procurement
  - typical approaches to planning and management
  - successful planning techniques
  - best practice management methods and styles
- relevant manufacturer specifications
- relevant safe job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0059 Prepare and connect refrigerant tubing and fittings

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Incorrect Performance Criteria numbering in Element 1 fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare and connect refrigeration and air conditioning piping/tubing and fittings.

It includes cutting, bending and connecting copper tubes to copper tubes and to brass and steel fittings by flaring and swaging using compression fittings and silver brazing.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the installation, service and repair of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work.

Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to fabricate tubing and attach fittings for refrigeration and/or air conditioning system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from supervisor
	1.3 Nature of work is obtained from documentation or supervisor to determine scope of work to be undertaken
	1.4 Advice is sought from supervisor to ensure work is coordinated effectively with others
	1.5 Materials required for the work are accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety
2 Fabricate tubing and attach fittings for refrigeration and/or air conditioning system	**2.1** Tasks are completed in accordance with workplace safety procedures
	2.2 Relevant safe work methods are used to cut, flare, swage, bend and silver braze tubing and fittings as they apply to refrigeration and/or air conditioning systems
	2.3 Refrigerant tubing and fittings are silver brazed with the use of dry nitrogen to prevent contamination
	2.4 Fabricated tubing and fittings are prepared without waste of materials or damage/contamination to apparatus, the

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		surrounding environment or services using relevant workplace sustainable energy practices in accordance with workplace procedures
	2.5	Quality checks are carried out regularly in accordance with workplace procedures, instructions/or specifications, including dimensions and pressure testing
3 Complete work and report	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Supervisor is notified of task completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Preparing and connecting refrigerant tubing and fittings must include at least the following:	• cutting, flaring, bending and swaging using compression fittings, silver brazing copper tube to copper tube and brass and steel fittings • piping/tubing and fittings for high-pressure refrigerants

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ102A Prepare and connect refrigerant tubing and fittings.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0059 Prepare and connect refrigerant tubing and fittings

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Incorrect Performance Criteria numbering in Element 1 fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards, codes of practice, regulations and work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing documentation and reporting requirements
- identifying and monitoring hazards and using applicable safety data sheets (SDS)/material safety data sheets (MSDS)
- preparing, fabricating and attaching refrigerant tubing and fittings, including:
  - attaching fittings correctly
  - conducting component quality checks
  - cutting, bending and joining refrigerant piping and tubing using appropriate tools and equipment, including compression fittings and high-pressure refrigerants
  - silver brazing copper tubes and fittings using dry nitrogen
- setting up equipment safely.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- copper tube grades, including types, properties, applications and handling
- dissimilar metals, including:
  - aluminium
  - brass

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  - steel
  - stainless steel
- potential hazards with refrigerant tubing and fittings
- refrigerant tubing and fittings techniques, including:
  - annealing
  - bending
  - cutting
  - flaring
  - tube expanding
  - joining
  - silver brazing
  - use of dry nitrogen
- refrigeration copper tube fittings and access valves
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- SDS/MSDS
- sustainable energy principles and practices
- tools and equipment, including care and maintenance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0060 Produce HVAC/R control system diagrams

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce heating, ventilation and air conditioning/refrigeration (HVAC/R) control system diagrams.

It includes applying safe working practices, interpreting technical data and specifications, applying knowledge of HVAC/R control systems drawing protocols, using appropriate drawing tools and documenting design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

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UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to produce HVAC/R control system diagrams	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for the work
	1.3 Scope of work is determined from project specifications and/or discussions with relevant person/s
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5 Software tools and equipment required for work are obtained in accordance with workplace procedures
2 Produce HVAC/R control system diagrams	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Relevant control diagrams and layouts required are determined in accordance with project specifications
	2.3	Technical data of control system components is interpreted to determine parameters for inclusion in accordance with project specifications
	2.4	Relevant software tools are used to produce diagrams in accordance with project specifications
	2.5	Diagrams are checked for accuracy in accordance with project specifications and workplace procedures
	2.6	Unplanned events are dealt with in accordance with workplace procedures and safe work practices
3 Complete and report HVAC/R control system diagrams	**3.1**	Completed control diagrams are submitted to relevant person/s for accuracy in accordance with project specifications and workplace procedures
	3.2	Alterations, additions and/or corrective instructions are followed and diagrams are re-submitted for final approval in accordance with project specifications and workplace procedures
	3.3	Copies of completed diagrams are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Producing control system design diagrams must include at least the following:	• two different HVAC/R projects

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ130A Produce HVAC/R control system

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diagrams.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0060 Produce HVAC/R control system diagrams

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the drawing work accurately
- determining appropriate types of diagrams and their layouts correctly
- including appropriate technical data parameters in the diagrams
- checking and correcting diagrams accurately
- filing copies of completed drawing securely
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including using risk control measures
- completing and reporting heating, ventilation and air conditioning/refrigeration (HVAC/R) control system diagrams
- preparing to produce HVAC/R control system diagrams
- producing HVAC/R control system diagrams.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC/R control system fundamentals, safe working practices and relevant standards, codes and regulations, including:
  - control fundamentals:
    - control terminology
    - refrigeration system characteristics
    - HVAC system characteristics
    - control system characteristics
    - control system components
    - control system diagrams and symbols

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    - product knowledge
- types of control equipment:
    - electrical:
        - classification of circuits
        - two position control
        - floating control
        - sensors
        - controllers
        - flow control devices
        - control systems diagrams
    - electronic:
        - operating principles
        - sensors
        - controllers
        - control system diagrams
- control systems applications:
    - refrigeration
    - air conditioning
    - air handling system controls
    - ventilation
    - heating
    - building airflow system control
    - airflow control
    - singles and multi-zones
    - chiller/boiler and distribution system control (chilled water, boiler and distribution systems)
- relevant manufacturer specifications
- relevant safe job safety assessments or risk mitigation processes
- relevant software tools and equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

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where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0061 Produce HVAC/R system design drawings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce heating, ventilation and air conditioning/refrigeration (HVAC/R) system design drawings.

It includes applying safe working practices, interpreting technical data and specifications, applying knowledge of HVAC/R systems design drawing protocols, using appropriate drawing tools and documenting design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0001 Analyse the operation of HVAC air and hydronic systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

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UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to produce HVAC/R design drawings	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures in preparation for the work are followed
	1.3 Scope of work is determined from project specifications and/or discussions with relevant person/s
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.5 Software tools and equipment required for work are obtained in accordance with workplace procedures
2 Produce HVAC/R design drawings	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed

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	2.2	Relevant design drawings and layouts required are determined in accordance with project specifications
	2.3	Technical data of system components is interpreted to determine parameters for inclusion in accordance with project specifications
	2.4	Relevant software tools are used to produce drawings in accordance with project specifications
	2.5	Drawings are checked for accuracy in accordance with project specifications and workplace procedures
	2.6	Methods for dealing with unplanned events are conducted in accordance with workplace procedures and safe work practices
3 Complete and report HVAC/R design drawings	**3.1**	Completed drawings are submitted to relevant person/s for accuracy in accordance with project specifications and workplace procedures
	3.2	Alterations, additions and/or corrective instructions are followed and drawings are re-submitted for final approval in accordance with project specifications and workplace procedures
	3.3	Copies of completed drawings are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

producing design drawings must include at least the following:	• two different HVAC/R projects
servicing and repairing secondary refrigeration systems must include at least two	• chilled water or glycol/brine system • condenser water system • defrost system

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of the following system types: servicing and repairing secondary refrigeration systems must include the following components:	• heat recovery system • thermal storage system • cycling controls • heat exchangers • primary refrigerant flow controls • pumps • safety controls • secondary refrigerant flow controls • secondary refrigerant piping, insulation and associated equipment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ128A Produce HVAC/R system design drawings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0061 Produce HVAC/R system design drawings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the drawing work accurately
- determining appropriate types of drawings and their layouts correctly
- including appropriate technical data parameters in the drawings
- checking and correcting drawings accurately
- filing copies of completed drawings securely
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- completing and reporting heating, ventilation and air conditioning/refrigeration (HVAC/R) design drawings
- preparing to produce HVAC/R design drawings
- producing HVAC/R design drawings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- HVAC/R system drawing, safe working practices and relevant standards, codes and regulations, including:
  - architectural and mechanical drafting conventions encompassing:
    - fire, hydraulic, electrical layout diagrams
    - sketching of pipe work circuits and mechanical services
    - drawing standards and symbols
    - working, detail and assembly drawings
    - ductwork layouts and conventions
    - pipe work layouts and conventions

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- computer-aided drawing techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant software tools and equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0062 Recover and charge refrigerants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to recover, pressure test, evacuate and charge refrigerants from refrigeration and air conditioning systems.

It includes recovering refrigerants, pressure testing, evacuating, charging refrigerants into refrigeration systems and completing documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the recovery and charging of refrigerants on refrigeration and air conditioning systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to recover and charge refrigerant	**1.1** WHS/OHS hazards, risk control methods, relevant industry standards, codes of practice and legislation are obtained and applied in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Work tasks are sequenced in accordance with job schedule and workplace procedures
	1.4 Supervisor is consulted to ensure work is coordinated with others in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to complete the work are obtained and checked for operational safety in accordance with workplace procedures
2 Recover and charge refrigerant	**2.1** Refrigerant is removed from a functional refrigeration and/or air conditioning system safely, using appropriate recovery and/or reclaim equipment, and is placed into labelled containers in accordance with relevant codes of practice, regulatory requirements and industry standards
	2.2 Pressure testing is conducted in accordance with relevant codes and standards at a pressure compatible with the type of refrigerant employed in the system and without damage to components in accordance with workplace procedures and industry standards
	2.3 Leaks are located and rectified using testing methods appropriate to functional refrigeration and/or air conditioning system under test in accordance with relevant codes of practice, regulatory requirements and industry standards
	2.4 Functional refrigeration and/or air conditioning system is evacuated to required level and cleaned of all moisture and other contaminates in accordance with relevant codes of practice, regulatory requirements and industry standards

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	2.5	Functional refrigeration and/or air conditioning system is charged with appropriate refrigerant in accordance with relevant standards, codes of practice, regulatory requirements and manufacturer specifications
	2.6	Problematic situations are resolved in accordance with workplace procedures
	2.7	Functional refrigeration and/or air conditioning system is pressure and leak tested, evacuated and charged without waste of materials, damage to apparatus, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures and industry standards
3 Complete and report refrigerant recovery and charging	**3.1**	WHS/OHS work completion risk control measures are applied in accordance with workplace procedures
	3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.3	Recovered and/or reclaimed refrigerant and lubricant are dealt with in accordance with relevant industry standards, codes of practice and regulatory requirements
	3.4	Completion of work is documented in an auditable logbook and supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide

Unit Mapping Information

No equivalent unit.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0062 Recover and charge refrigerants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- charging the system with the correct type and quantity of refrigerant
- completing necessary documentation
- documenting work, including refrigerant usage and removal
- evacuating a system to required level
- following manufacturer specifications and manuals
- implementing relevant legislation, industry standards, codes of practice and regulations
- performing a vacuum test
- pressure testing a system to design conditions
- recovering refrigerant from a system
- testing the system for leaks and rectifying as necessary.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- evacuation and dehydration, including vacuum pump types, use and care, suitable vacuum measuring instruments, drop testing and evacuation methods, including triple and deep
- pressure testing, including suitable gases, test values in accordance with standards and safe working procedures
- refrigerant charging procedures and methods, including vapour and liquid
- refrigerant recovery, including pump types, procedures for vapour and liquid recovery, disposal of recovered refrigerant and safety issues
- relevant legislation, industry standards, codes of practice and regulations.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0063 Recover, pressure test, evacuate, charge and leak test refrigerants - appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to recover refrigerants, conduct pressure and leak tests, and evacuate and charge refrigerants in a self-contained appliance. This includes flammable and non-flammable refrigerants.

Competency in this unit requires the ability to work safely, prepare for and implement the recovery of refrigerants, undertake pressure and leak testing, perform evacuations and charging of refrigeration appliances as well as completing all required documentation.

Individuals will typically work independently to safely handle refrigerants used in appliances.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit may require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to recover refrigerants, pressure and leak test, evacuate and charge refrigeration appliance	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards which have not previously been identified are noted and risk control measures implemented in accordance with workplace procedures
	1.3 Extent of work to be completed is determined from documentation and/or discussion with supervisor/appropriate person/s in accordance with workplace procedures
	1.4 Work is sequenced in accordance with job schedule and workplace procedures
	1.5 Appropriate person/s is consulted, as required, to ensure work is coordinated with others
	1.6 Refrigerants, lubricants and cleaning materials are obtained in accordance with workplace procedures
	1.7 Tools, equipment and testing devices are obtained in accordance with workplace procedures and checked for operational safety
2 Recover refrigerants, pressure and leak test, evacuate and charge refrigeration appliance	**2.1** Checks are carried out to ensure system or component parts are isolated, when necessary, in accordance with workplace procedures and WHS/OHS requirements

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	2.2	Circuits, machines and plant are checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.3	Refrigerant is removed from appliance safely and is placed into labelled containers in accordance with workplace procedures and regulatory requirements
	2.4	Precautions are taken in accordance with workplace procedures to prevent damage to components while pressure testing appliance
	2.5	Pressure testing is conducted in accordance with workplace procedures using dry nitrogen at a pressure relative to refrigerant used
	2.6	Leaks are located and rectified using testing methods appropriate to the appliance under test in accordance with workplace procedures
	2.7	Appliance is evacuated to required level and is cleaned of all moisture and other contaminates in accordance with workplace procedures
	2.8	A 'drop test' is used to test effectiveness of evacuation in accordance with workplace procedures using an appropriate electronic vacuum gauge
	2.9	Components and lubricants are checked and maintained in accordance with workplace procedures and manufacturer specifications
	2.10	Appliance is charged with appropriate refrigerant in accordance with workplace procedures and manufacturer specifications
	2.11	Problematic situations are resolved in accordance with workplace procedures and are referred to a supervisor
	2.12	Appliance is pressure and leak tested, evacuated and charged without waste of materials or damage to apparatus, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report on refrigerants recovery pressure and leak test and evacuate and charge work	**3.1**	Worksite and equipment are cleaned and made safe in accordance with workplace procedures

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3.2 Contaminated refrigerant is dealt with in accordance with workplace procedures and legislative/regulatory requirements

3.3 Completion of work is documented and an appropriate person/supervisor is notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Recovering, pressure testing, evacuating, charging and leak testing refrigerants must include testing and charging refrigeration or air conditioning appliances using vacuum measuring instruments and include the following:

- recovering refrigerant from an existing appliance that may contain contaminants
- pressure and leak testing a newly installed or repaired appliance
- evacuating an appliance in preparation for charging with refrigerant
- charging an appliance with refrigerant with minimal loss
- flammable and non-flammable refrigerants

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ162A Recover, pressure test, evacuate, charge and leak test refrigerants - appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0063 Recover, pressure test, evacuate, charge and leak test refrigerants - appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying legislation, industry standards, codes of practice and regulations
- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - implementing safe handling procedures
  - using risk control measures
- completing and reporting on work activities
- preparing to recover refrigerants, pressure and leak test, evacuate and charge refrigeration appliances
- recovering refrigerants, pressure and leak testing, evacuating and charging refrigerant appliance, including:
  - completing documentation
  - conducting pressure testing at appropriate pressure level without damaging components
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - evacuating system to required level
  - evacuating system to required standard using vacuum measuring instruments
  - locating and rectifying leaks
  - removing and storing refrigerant
  - using flammable and non-flammable refrigerants
  - selecting materials and equipment
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- flammable and non-flammable refrigerants
- recover, pressure and leak test, evacuate and charge refrigerant appliances, including:
  - refrigerant properties
  - safe handling practices
  - refrigeration oil recovery and reclaim procedures
  - pressure testing
  - leak detection
  - evacuation and dehydration
  - refrigerant and oil charging
  - system contamination
  - refrigeration component replacement
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - safe working practices
  - potential hazards
  - risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0064 Recover, pressure test, evacuate, charge and leak test refrigerants - split systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to undertake the recovery of refrigerants, perform pressure and leak testing, evacuations and refrigerant charging in split air conditioning and heat pump systems.

It includes working safely; applying relevant regulations, industry standards and codes of practice in recovering refrigerants; performing pressure and leak tests; evacuating and charging with refrigerant split systems; and completing all required documentation.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to recover refrigerant**,** pressure and leak test**,** evacuate and charge split system**s**	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards not previously identified are assessed, reported and advice on risk control measures sought from supervisor
	1.3 Nature of the work is obtained from documentation or supervisor to determine the scope of work to be undertaken
	1.4 Work activity is appropriately sequenced in accordance with job schedule
	1.5 Relevant person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.6 Refrigerant, lubricants and cleaning materials for work are obtained in accordance with workplace procedures and checked against job/task requirements
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
	1.8 Preparatory work is inspected and checked to ensure no damage has occurred and complies with workplace procedures and job/task requirements
2 Recover refrigerant, pressure and leak test evacuate and charge split systems	**2.1** Checks are carried out to ensure the system and/or component parts are isolated in accordance with workplace procedures
	2.2 Machines, plant and circuits are isolated in accordance with workplace procedures
	2.3 Refrigerants are safely removed from split system and placed into labelled containers in accordance with regulatory requirements, industry standards and codes of

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		practice, and any electrical work is referred to a licensed electrician in accordance with workplace procedures.
	2.4	Precautions are taken to prevent damage to components while pressure testing the system
	2.5	Pressure testing is conducted using dry nitrogen at a pressure relative to the refrigerant to be used
	2.6	Leaks are located and rectified using testing methods appropriate to system under test in accordance with industry standards
	2.7	Split system is evacuated to required level and system is cleaned of all moisture and other containments in accordance with industry standards and codes of practice
	2.8	A drop test is performed to test evacuation using an electronic vacuum gauge in accordance with industry standards and codes of practice
	2.9	Component lubricants are checked and maintained in accordance with manufacturer specifications
	2.10	Split systems are charged with refrigerant in accordance with manufacturer specifications, industry standards and codes of practice
	2.11	Problematic situations are resolved in accordance with workplace procedures and reported to supervisor
	2.12	Split systems are pressure and leak tested, evacuated and charged without waste of materials or damage to apparatus, the surrounding environment or services in accordance with relevant workplace sustainable energy practices
3 Report on refrigerant recovery, pressure and leak test, evacuation and charge work	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Contaminated refrigerant is dealt with in accordance with workplace procedures and legislative/regulatory requirements
	3.3	Completion of work is documented and appropriate person/supervisor notified in accordance with workplace

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procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

testing and charging split air conditioning systems must include at least the following:	• determining, using measurement and basic calculations methods, the operating conditions of vapour compression split system, including suction and discharge pressures • ambient, evaporator and condensing temperatures • evaporator and condenser temperature differences recovering Class A1 and A2L refrigerant from an existing split system, including split single head air conditioning and/or hot water heat pump systems pressure and leak testing a newly installed system • evacuating newly installed systems in preparation for charging with refrigerant • charging newly installed systems with Class A1 and A2L refrigerant

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ172A Recover, pressure test, evacuate, charge and leak test refrigerants - split systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0064 Recover, pressure test, evacuate, charge and leak test refrigerants - split systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards
  - risk control measures
  - using personal protective equipment (PPE)
- applying safe working practices and relevant legislation, industry standards, codes of practice and regulations
- completing required documentation, including reporting refrigerant recovery, pressure and leak tests, evacuations, charging refrigerant work and system operating conditions determining basic operating conditions, including:
  - ambient, evaporation and condensing temperatures
  - evaporator and condenser temperature differences
  - suction and discharge pressures
- recovering, pressure testing, evacuating, charging and leak testing refrigerant in newly installed split systems to requirements using appropriate equipment, tools and measurement devices
- starting up system and performing function checks
- selecting, obtaining and checking relevant equipment, materials, tools and testing devices required to carry out the work, including:
  - A1, A2 and A2L class refrigerants, lubricants and charging equipment
  - oxygen-free dry nitrogen cylinder and regulator
  - pressure and temperature measurement devices
  - pressure testing and refrigerant leak testing equipment and tools
  - refrigeration evacuation equipment and measuring equipment suitable for A1, A2 and A2L class refrigerants
  - refrigerant recovery/reclaim equipment suitable for A1, A2 and A2L class refrigerants
  - refrigeration hand and power tools
  - refrigeration service tools

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  - single head split air conditioning systems
- using lubricants and cleaning materials safely in accordance with safety data sheets (SDS)/material safety data sheets (MSDS).

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- equipment and procedures for working with refrigerants, including:
  - charging refrigerant into a newly installed split system detecting refrigerant leaks (electronic, bubbles and halide for R22)
  - contaminant detection and removal
  - evacuating newly installed split systems
  - pressure testing systems newly installed split systems using dry nitrogen
  - reclaiming/recovering refrigerants using recovery units and recovery cylinders
- heat and heat transfer
- leak detectors types, applications, operation and procedures
- manifold gauges types, applications, operation and procedures
- pressure temperature relationships and charts
- pressure, units and measurement
- refrigerant conditions, including saturation, superheat and sub-cooling
- relative humidity, unit and measurement
- relevant industry standards, codes of practice and regulations, including WHS/OHS legislated requirements
- relevant manufacturer specifications
- relevant risk mitigation processes, including risk control measures
- safe working practices, safe handling and SDS/MSDS
- sensible and latent heat
- split heat pump Class A1, A2 and A2L refrigerant types, properties and applications
- split heat pump refrigerant oil types, properties and applications
- sustainable energy principles and practices, including:
  - environment protection requirements
  - sustainable energy practices
  - sustainable resources
- system access fittings types, applications, operation and procedures
- temperature, units and measurement
- vapour compression cycle, basic operation and major system components.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0065 Repair and service ammonia refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and service ammonia refrigeration systems.

It includes servicing and repairing refrigeration equipment using ammonia as the refrigerant. It also includes applying safe working practice and refrigeration principles that apply to ammonia; following service manuals; testing, locating and rectifying faults and defective components, and completing necessary service documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigeration systems using ammonia refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service ammonia refrigeration system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards which have not been previously identified are reported, risk assessed and advice on risk control measures sought from work supervisor
	1.3 Nature of work is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for the refrigeration work are accessed in accordance with workplace and procedures
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
2 Service and repair ammonia refrigeration system	**2.1** Measuring system operating parameters are conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.2 Refrigeration inspection and checks are carried out to ensure the system or component parts are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Refrigerant is removed from system safely in accordance with regulatory requirements, industry standards and practices
	2.4 Precautions are taken to prevent damage to components

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		while pressure testing the refrigeration system
	2.5	Pressure testing is conducted at a pressure compatible with ammonia and in accordance with industry standards
	2.6	Refrigeration leaks are located and rectified using testing methods appropriate to the system and in accordance with industry standards and practices
	2.7	Oil is removed from an operational ammonia refrigeration system in accordance with industry standards and practices
	2.8	Refrigeration system is charged safely with ammonia and compatible lubricants in accordance with industry standards and practices
	2.9	Actual and specified range of operating conditions are determined from measured and calculated values as they apply to ammonia vapour compression and liquid recirculation systems in accordance with workplace procedures and industry standards
	2.10	Unplanned situations are dealt with safely in accordance with workplace procedures and with approval of an authorised person/s in a manner that minimises risk to personnel and equipment
	2.11	Operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete and report servicing and repairing ammonia refrigeration system	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory requirements and industry standards
	3.3	Operation conditions are documented and include identification of any parameter that is not within the specified range for the system
	3.4	Work supervisor is notified of the completion of the work in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing ammonia refrigeration systems must include at least the following:	• one ammonia refrigerant refrigeration system, including the following:
	  • determining operating conditions using measurement and basic calculation methods:
	  • suction and discharge pressures
	  • ambient
	  • evaporator and condensing temperatures
	  • evaporator and condenser temperature differences
	  • discharging/recovering refrigerant, replacing components, testing pressure, evacuating, charging and leak testing an ammonia refrigerant system in a safe and environmentally responsible manner

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ179A Repair and service ammonia refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0065 Repair and service ammonia refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- decontaminating and evacuating the system
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly
- identifying the conditions of the ammonia (R717) refrigerant at various locations in the vapour compression and liquid recirculation system
- locating and rectifying leaks
- recording measurements
- selecting and using appropriate measuring devices correctly
- servicing, pressure testing, charging/discharging refrigerant/lubricants and determining the operating conditions of ammonia vapour compression and liquid recirculation refrigeration system
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ammonia refrigeration systems and operating conditions, including:
  - cascade systems
  - direct expansion systems

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  - flooded systems
  - liquid recirculation systems
  - multi-staged systems
  - revision of vapour compression cycle
  - single staged systems
  - types of ammonia systems
  - vapour compression systems
- properties of ammonia
- safe handling of ammonia
- ammonia refrigeration system's major components, flow controls and ancillary components
- relevant job safety assessments or risk mitigation processes hazards associated with ammonia refrigeration systems
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including service manuals and service documentation
- relevant workplace policies and procedures, including workplace emergency response plan
- servicing and repairing techniques for ammonia refrigeration systems, including:
  - adding refrigerant
  - leak detection methods
  - removing refrigerant.
  - servicing procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, emergency response plan, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0066 Repair and service carbon dioxide refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and service carbon dioxide (CO^2) refrigeration system.

It includes servicing and repairing refrigeration equipment using CO^2 as a refrigerant excluding self-contained trans-critical systems. It also includes applying safe working practices and refrigeration principles that apply to CO^2; following service manuals; testing, locating and rectifying faults and defective components; and completing the necessary service documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigeration systems using CO^2 refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service CO^2 refrigeration system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards not previously identified are assessed, reported and advice on risk control measures sought from work supervisor
	1.3 Nature of refrigeration work is obtained from documentation or from work supervisor to determine the scope of refrigeration work to be undertaken
	1.4 Advice is sought from work supervisor to ensure refrigeration work is coordinated effectively with others
	1.5 Sources of materials required for the work are accessed in accordance with workplace and procedures
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
2 Service and repair CO^2 refrigeration system	**2.1** Measuring refrigeration system operating parameters is conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.2 Inspection and checks are carried out to ensure the refrigeration system or component parts are isolated in accordance with WHS/OHS requirements, industry standards and practices
	2.3 Refrigerant is removed from refrigeration system safely in accordance with WHS/OHS requirements, industry standards and practices
	2.4 Precautions are taken to prevent damage to components while pressure testing refrigeration system

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	2.5	Pressure testing is conducted at a pressure compatible with CO^2 and in accordance with WHS/OHS requirements, industry standards and practices
	2.6	Leaks are located and rectified using testing methods appropriate to the refrigeration system and in accordance with industry standards and practices
	2.7	Refrigeration system is evacuated to the required level and cleaned of moisture and other contaminants in accordance with industry standards and practices
	2.8	Refrigeration system is charged safely with refrigerant grade CO^2 and compatible lubricants in accordance with industry standards and practices
	2.9	Actual and specified range of operating conditions are determined from measured and calculated values as they apply to sub-critical CO^2 vapour compression and liquid recirculation/cascade systems in accordance with workplace procedures
	2.10	Unplanned situations are responded to and discussed with appropriate person/s and documented in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.11	Refrigeration operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and report on servicing CO^2 refrigeration system	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory requirements
	3.3	Operation conditions are documented and include identification of any parameters that are not within the specified range for the refrigeration system
	3.4	Work supervisor is notified of the completion of work in accordance with established procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing CO^2 refrigeration systems must include at least the following:	• charging and discharging a CO^2 system with refrigerant and lubricant in a safe and environmentally responsible manner, excluding self-contained systems
	• determining:
	  • suction and discharge pressures
	  • ambient, evaporator and condensing temperatures
	  • evaporator and condenser temperature difference
	  • critical point, triple point, trans-critical and sub-critical refrigerant conditions

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ185A Repair and service carbon dioxide refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0066 Repair and service carbon dioxide refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislative, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing work and reporting on servicing and repairing sub-critical carbon dioxide (CO^2) refrigeration systems
- conducting work observing the relevant legislation, regulations, polices and workplace procedures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- decontaminating and evacuating the system
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly
- identifying the conditions of the CO^2 refrigerant at various locations in the vapour compression and volatile secondary (liquid recirculation) system
- locating and rectifying leaks
- preparing to service and repair CO^2 refrigeration systems
- pressure testing, charging/discharging refrigerant/lubricants and determining the operating conditions of CO^2 vapour compression and volatile secondary (liquid recirculation) system
- recording measurements
- selecting and using appropriate measuring devices correctly
- servicing and repairing CO^2 refrigeration systems
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- CO^2 refrigeration systems, including:
  - basic CO^2 refrigeration system
  - basic liquid recirculation /cascade system employing CO^2 refrigerant at sub-critical condition
  - benefits of using CO^2 as a refrigerant
  - thermophysical properties
- operating conditions of CO^2 refrigeration systems, including:
  - applicable standards and codes
  - CO^2 refrigeration compressors and lubricants
  - system components, construction and operation
- servicing and repair techniques for CO^2 refrigeration systems, including:
  - moisture problems with CO^2 systems
  - refrigerant conditions
  - refrigerant cylinders and regulators
  - service gauges
  - service procedures
  - system standing pressure as a result of power loss.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0067 Repair and service secondary refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and service secondary refrigeration systems.

It includes maintaining the effective and efficient operation of refrigeration equipment using non-phase changing secondary refrigerant systems. It also includes applying safe working practices, utilising service manuals and refrigeration principles to test and perform maintenance operations to these systems and to locate defective components and repair faults, and completing reports on service and performance outcomes.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of secondary refrigerant systems.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0053 Install, commission, service and maintain medium temperature systems

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service secondary refrigeration system	**1.1** Type of secondary refrigeration system components and operation are identified
	1.2 WHS/OHS requirements and workplace procedures and safety data sheets (SDS) are identified and risk control measures implemented, including wearing personal protective equipment (PPE)
	1.3 Safety hazards not previously identified are assessed, documented and risk control measures devised and implemented
	1.4 Extent of faults is determined from reports, documentation, observation and discussions with appropriate person/s
	1.5 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Carry out secondary refrigeration maintenance requirements	**2.1** WHS/OHS requirements, regulations, workplace procedures and risk control measures are followed
	2.2 Components are checked and isolated in accordance with WHS/OHS requirements and procedures
	2.3 Refrigeration maintenance tests are performed on the primary cooling source, operating pressures, operating current, refrigerant charge, secondary flow rates and condenser cooling system, and system faults or non-compliance documented to operational

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		specifications
	2.4	Refrigeration operational maintenance tests are performed on the secondary refrigerant pumping/circulation devices, pressure and flow rates recorded, and faults or non-compliance to system specification documented
	2.5	Chemical integrity, including the dilution rate, anti-bacterial and anti-corrosion rates of the secondary refrigerant, is checked using test kit and following approved WHS/OHS procedures, including PPE, and results or non-compliance are documented
	2.6	Secondary refrigerant pipe work is checked for leaks and stability and its insulation is checked for soundness
	2.7	Refrigeration system components, evaporators, blowers, other heat exchangers, heat recovery or defrost systems are checked for correct operation and cleanliness
	2.8	Control system operation, including safety controls and any faults or non-conformity to system specifications are documented in accordance with WHS/OHS guidelines and workplace practices
3 Repair secondary refrigeration system	**3.1**	Justification for solutions used to solve refrigeration system problems is documented in accordance with workplace procedures
	3.3	Repair work is documented and appropriate person/s notified in accordance with workplace procedures
	3.4	Repairs to refrigeration system components are performed to achieve compliance to design operation and manufacturer recommendations for effective operation
	3.5	Refrigeration control system are adjusted, as required, to achieve compliance to design operation and manufacturer recommendations for effective operation
	3.6	Record of flows, pressures and temperatures obtained before and after repair are compared to refrigeration specifications and contingency measures implemented, as required, to ensure compliance to design operation and manufacturer recommendations for effective operation

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4 Complete reports on refrigeration maintenance and repair activities	**4.1**	Work area is cleaned and made safe in accordance with workplace procedures and practices
	4.2	Refrigeration service/maintenance and repair activities on secondary refrigeration system and relevant non-compliance specification after repair are documented and reported to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing secondary refrigeration systems must include at least two of the following system types:	• chilled water or glycol/brine system • condenser water system • defrost system • heat recovery system • thermal storage system
Servicing and repairing secondary refrigeration systems must include the following components:	• cycling controls • heat exchangers • primary refrigerant flow controls • pumps • safety controls • evaporators/cooling coils, forced and natural draft • secondary refrigerant flow controls • secondary refrigerant piping, insulation and associated equipment
Spparatus must include at least the following:	• chilled water systems (primary system) • ice bank systems
Systems must include at least the following:	• cool rooms • freezer rooms • merchandising and display cabinets • other commercial or industrial applications

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ182A Repair and service secondary refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0067 Repair and service secondary refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislation, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- servicing and repairing secondary refrigeration systems, including:
  - applying logical diagnostic methods
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - using fault scenarios to test the cause of system faults
  - verifying that the system operates correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- applicable standards and codes
- basics of secondary refrigeration systems, including:
  - operation
  - applications
  - types and safe handling of secondary refrigerants,
  - need for use of anti-bacterial and corrosion inhibitor
  - use of personal protective equipment (PPE)
- control system, pressure, temperature and safety

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- control valves, balance and operational
- documentation and reports
- maintenance procedures for secondary refrigeration systems
- maintenance requirements, including pumps, chemical integrity of refrigerant, cooling coils/freezing coils operation, leak detection additives, leak testing, pipe work and insulation, control valves and control system
- major components types, location, purpose, operation and safety
- refrigerant disposal Environment Protection Authority (EPA) requirements
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant refrigeration system industry standards and codes of practice
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- repairs to secondary refrigerant systems, including:
  - cooling coils/freezing coils
  - system leaks, pipe work or insulation
  - control valves, control system components
  - chemical integrity of refrigerant
- secondary refrigeration systems
- service and repair of secondary refrigeration systems
- tools and equipment for maintenance work.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0068 Repair and service self-contained carbon dioxide refrigeration and heat pump systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair and service self-contained carbon dioxide (CO^2) refrigeration and heat pump system.

It includes specialised procedures for servicing and repairing of self-contained refrigeration and heat pump equipment using CO^2 as a refrigerant. It also includes applying safe working practices and refrigeration principles that apply to CO^2; following service manuals; testing, locating and rectifying faults and defective components; and completing the necessary service documentation.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of self-contained refrigeration systems using CO^2 refrigerant.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEERA0053 Install, commission, service and maintain medium temperature systems

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

Or

UEERA0089 Service refrigeration appliances

UEERA0006 Apply safety awareness and legal requirements for carbon dioxide refrigerant

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service self-contained CO^2 refrigeration and heat pump system	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards not previously identified are reported, risk assessed and advice on risk control measures sought from work supervisor
	1.3 Nature of work is obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials required for the refrigeration work are accessed in accordance with workplace and procedures
	1.6 Tools, equipment and testing devices needed to carry out refrigeration work are obtained and checked for correct operation and safety
2 Service and repair self-contained CO^2 refrigeration and heat pump system	**2.1** Measuring system operating parameters are conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.2 Refrigeration inspection and checks are carried out to ensure the system or component parts are isolated in accordance with WHS/OHS requirements and

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	workplace procedures
	2.3 Refrigerant is removed from system safely in accordance with regulatory requirements, industry standards and practices
	2.4 Precautions are taken to prevent damage to components while pressure testing the refrigeration and heat pump system
	2.5 Pressure testing is conducted at a pressure compatible with CO^2 and in accordance with industry standards and practices
	2.6 Refrigerant leaks are located and rectified using testing methods appropriate to the system and in accordance with industry standards and practices
	2.7 Refrigeration and heat pump system is evacuated to the required level and cleaned of all moisture and other contaminants in accordance with industry standards and practices
	2.8 Refrigeration and heat pump system is charged safely with refrigerant grade CO^2 and compatible lubricants in accordance with industry standards and practices
	2.9 Actual and specified range of operating conditions are determined from measured and calculated values as they apply to CO^2 vapour compression systems in accordance with workplace procedures and industry standards
	2.10 Unplanned situations are dealt with safely and in accordance with workplace procedures and approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.11 Operating conditions are determined without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete and report servicing and repair of self-contained CO^2 refrigeration and heat pump system work activities	**3.1** Worksite is cleaned and made safe in accordance with workplace procedures
	3.2 Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory and industry

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standard requirements

3.3 Operation conditions are documented and include identification of any parameter that is not within the specified range for the system

3.4 Work supervisor is notified of the completion of work in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing self-contained CO^2 vapour compression systems must include at least the following:

- domestic refrigerators and freezers
- refrigerated cabinets
- heat pumps
- water heaters
- checking:
  - suction and discharge pressures
  - ambient, evaporator and condensed/gas cooler temperatures
  - evaporator and gas cooler temperature difference
  - critical point, triple point and trans-critical and sub-critical refrigerant conditions of CO^2
- charging and discharging trans-critical CO^2 system with refrigerant and lubricant in a safe and environmentally responsible manner

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ188A Repair and service self contained carbon dioxide refrigeration and heat pump systems.

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Links

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Assessment Requirements for UEERA0068 Repair and service self-contained carbon dioxide refrigeration and heat pump systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislation, industry standards and practices
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- discharging/charging refrigerant/lubricants and pressure testing the system without damage to components
- documenting operating conditions correctly
- identifying the conditions of the carbon dioxide (CO^2) refrigerant at various locations in the vapour compression system in a trans-critical and sub-critical state
- locating and rectifying leaks
- pressure testing, evacuating, charging/discharging refrigerant/lubricants and determining the operating conditions of CO^2 vapour compression systems
- recording measurements
- selecting and using appropriate measuring devices correctly
- using calculation methods accurately.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- CO^2 refrigeration compressors and lubricants, including:
  - types, construction and their applications
  - types of compatible compressor oil (Polyolester (POE) and Polyaphalefin (PAO))
  - safe handling of lubricants for CO^2 applications using safety data sheets (SDS)/material

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safety data sheets (MSDS)

- cylinder regulators
- moisture problems with CO^2 systems
- refrigerant CO^2 cylinders and regulators
- refrigerant conditions
- refrigeration principles
- relevant industry standards, codes and practices
- relevant job safety assessments or risk mitigation processes, including hazards associated with CO^2
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including service manuals and service documentation
- relevant workplace policies and procedures
- self-contained systems employing CO^2 refrigerant at trans-critical condition, including:
  - basic operation
  - domestic refrigerators and freezers
  - heat pumps
  - water heaters
  - refrigerated cabinets
  - systems and major components
  - typical applications
- service gauges
- service procedures
- CO^2 refrigerant, including:
  - benefits of using CO^2 as a refrigerant
  - thermophysical properties
- servicing tools, equipment and safe working procedures, including:
  - cylinder regulators
  - moisture problems with CO^2 systems
  - refrigerant CO^2 cylinders and regulators
  - refrigerant conditions
  - service gauges
  - service procedures
  - system standing pressure as a result of power loss
- system components, construction and operation, including:
  - capillary tubes and accurators
  - CO^2 evaporator design features
  - CO^2 sub-cooler design features
  - electronic expansion valves
  - liquid-suction heat exchangers

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  - pressure relief devices
  - refrigerant flow controls
- system standing pressure as a result of power loss.
- trans-critical CO^2 refrigeration and heat pump systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to servicing, repairing and determining the operating conditions of CO^2 vapour compression and liquid recirculation/cascade systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0069 Resolve problems in beverage dispensers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair refrigerated beverage dispensers.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of refrigerated beverage dispensing equipment; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigerated beverage dispensing equipment.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in beverage dispensers	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in beverage dispensers	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, where necessary, in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with

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		normal operating values of systems and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in beverage dispensers must include at least the following:	• three operational problems related to refrigerated beverage dispensers

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ115A Resolve problems in beverage dispensers.

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Assessment Requirements for UEERA0069 Resolve problems in beverage dispensers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in refrigerated beverage dispensers
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problem, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in refrigerated beverage dispensers
- resolving problems in refrigerated beverage dispensers effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- beverage dispensers, including:
  - applications

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  - components
  - construction
  - design features
  - system characteristics
  - typical layout arrangements
- refrigerated dispensed beverage products, including:
  - beer
  - soft drinks
- wine maintenance schedules
- normal operating parameters of beverage dispensers
- operating and control principles of beverage dispensers
- relevant food safety and hazard analysis and critical control points (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
  - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UEERA0070 Resolve problems in central plant air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair central plant air conditioning systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of central plant air conditioning systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of central plant air conditioning systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in central plant air conditioning systems	**1.1** WHS/OHS procedures are identified, obtained and implemented in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in central plant air conditioning systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, as required in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with

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		normal operating values of system and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Resolving problems in central plant air conditioning systems must include at least the following:	• three operational problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ167A Resolve problems in central plant air conditioning systems.

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Assessment Requirements for UEERA0070 Resolve problems in central plant air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in central plant air conditioning systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in central plant air conditioning systems
- resolving problems in central plant air conditioning systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- central plant air conditioning systems, including:
  - applications

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    - characteristics
    - components
    - construction
    - design features
    - typical layout arrangements
- maintenance schedules
- normal operating parameters of central plant air conditioning systems
- operating and control principles of central plant air conditioning systems
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
    - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, including 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEERA0071 Resolve problems in dairy refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair dairy refrigeration systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of dairy refrigeration systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of dairy refrigeration systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in dairy refrigeration systems	**1.1** WHS/OHS procedures are identified, obtained and implemented in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in dairy refrigeration systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, as required, in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with normal operating values of system and components

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	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems is documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Resolving problems in dairy refrigeration systems must include at least the following:

- three operational problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ166A Resolve problems in dairy refrigeration systems.

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Assessment Requirements for UEERA0071 Resolve problems in dairy refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in dairy refrigeration systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in dairy refrigeration systems
- resolving problems in dairy refrigeration systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- dairy refrigeration systems, including:
  - applications

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    - components
    - construction
    - design features
    - system characteristics
    - typical layout arrangements
- dispensed beverage product knowledge
- maintenance schedules
- normal operating parameters of dairy refrigeration systems
- operating and control principles of dairy refrigeration systems
- problem solving in dairy refrigeration systems
- pure food Act and hazard analysis and critical control points (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant standards, codes of practice and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- risk mitigation processes, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
    - safe working practices
- system faults and testing methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0072 Resolve problems in hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to resolve problems in hydronic systems.

It includes working safely and to industry standards, using effective problem-solving techniques to fault find and repair hydronic systems, completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigeration and air conditioning equipment with hydronic systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in hydronic systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in hydronic systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, where necessary, in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparison with normal

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		operating values of systems and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, and maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Resolving problems in hydronic systems must include at least the following:	• three operational problems related to hydronic systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ114A Resolve problems in hydronic systems.

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Assessment Requirements for UEERA0072 Resolve problems in hydronic systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in hydronic systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in hydronic systems
- resolving problems in hydronic systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hydronic systems used for refrigeration and/or air conditioning applications, including:
  - applications

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  - characteristics
  - components
  - construction
  - design features
  - typical layout arrangements
- maintenance schedules
- normal operating parameters of hydronic systems
- operating and control principles of hydronic systems
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
  - safe working practices
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEERA0073 Resolve problems in ice making systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair ice making systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of ice making systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of ice making systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in ice making systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Safety hazards not previously identified are noted and risk control measures implemented
	1.3 Scope of the problem is obtained from documentation and/or from work supervisor to determine the work to be completed
	1.4 Advice is sought from supervisor to ensure the work is coordinated effectively with others
	1.5 Materials required for work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in ice making systems	**2.1** Need to test and measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked and isolated in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparison with normal operating values of system and components

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	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, service records and measured and calculated values of component operating parameters, are obtained and evaluated in accordance with relevant industry operating parameters
	2.5	Problems are dealt with in accordance with WHS/OHS procedures and approval of relevant person/s
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Resolving problems related to ice making systems must include at least the following:

- three operational problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ119A Resolve problems in ice making systems.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0073 Resolve problems in ice making systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in ice making systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problem, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in ice making systems
- resolving problems in ice making systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ice making systems, including:
  - applications

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  - characteristics
  - components
  - construction
  - design features
  - typical layout arrangements
- maintenance schedules
- normal operating parameters of ice making systems
- operating and control principles of ice making systems
- relevant food safety and hazard analysis and critical control point (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
  - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEERA0074 Resolve problems in industrial refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair industrial refrigeration systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of industrial refrigeration systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of industrial refrigeration systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in industrial refrigeration systems	**1.1** WHS/OHS requirements and workplace procedures for a given work area are identified, obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Safety hazards not previously identified are noted and risk control measures implemented
	1.3 Scope of the problem is obtained from documentation and/or from work supervisor to determine the work to be completed
	1.4 Advice is sought from supervisor to ensure the work is coordinated effectively with others
	1.5 Materials required for work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Solve problems in industrial refrigeration systems	**2.1** Need to test and measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked and isolated in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are approached methodically through observation, measurement, calculations and comparisons with normal operating values of system and components
	2.4 Information to solve problems is gathered and evaluated in accordance with normal operating parameters

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	2.5	Unplanned situations are dealt with safely and with the approval of authorised person/s
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to solve problems is documented
	3.3	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in industrial refrigeration systems must include at least the following:

- three operational problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ120A Resolve problems in industrial refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0074 Resolve problems in industrial refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in industrial refrigeration systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in industrial refrigeration systems
- resolving problems in industrial refrigeration systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial refrigeration systems, including:
  - applications

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    - characteristics
    - components
    - construction
    - design features
    - typical layout arrangements
- maintenance schedules
- normal operating parameters of industrial refrigeration systems
- operating and control principles of industrial refrigeration systems
- relevant food safety and hazard analysis and critical control point (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
    - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEERA0075 Resolve problems in post-mix refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair post-mix refrigeration systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of post-mix refrigeration systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of post-mix refrigeration systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in post-mix refrigeration systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in post-mix refrigeration systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, where necessary, in accordance with legislative, standard and code requirements and workplace procedures.
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with

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		normal operating values of systems and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in post-mix refrigeration systems must include at least the following:	• three operational problems related to post-mix refrigeration systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ118A Resolve problems in post mix refrigeration systems.

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Assessment Requirements for UEERA0075 Resolve problems in post-mix refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in post-mix refrigeration systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problem, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in post-mix refrigeration systems
- resolving problems in post-mix refrigeration systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- dispensed beverage products, including:
  - soft drinks

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    - spirits
    - wine
- maintenance schedules
- normal operating parameters of post-mix refrigeration systems
- operating and control principles of post-mix refrigeration systems
- post-mix refrigeration systems, including:
    - applications
    - characteristics
    - components
    - construction
    - design features
    - typical layout arrangements
- relevant food safety and hazard analysis and critical control point (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
    - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0076 Resolve problems in refrigerated beverage vending cabinets

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair refrigerated beverage vending cabinets.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of refrigerated beverage vending cabinets; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of refrigerated beverage vending cabinets.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in refrigerated beverage vending cabinets	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in refrigerated beverage vending cabinets	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, as required, in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with

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		normal operating values of system and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and an appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Resolving problems in refrigerated beverage vending cabinets must include at least the following:	• three operational problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ171A Resolve problems in refrigerated beverage vending cabinets.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0076 Resolve problems in refrigerated beverage vending cabinets

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices,
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in refrigerated beverage vending cabinets
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in refrigerated beverage vending cabinets
- resolving problems in refrigerated beverage vending cabinets effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- maintenance schedules
- normal operating parameters of refrigerated beverage vending cabinets

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- operating and control principles of refrigerated beverage vending cabinets
- refrigerated beverage vending cabinets, including:
  - applications
  - characteristics
  - components
  - construction
  - design features
  - typical layout arrangements
- relevant food safety and hazard analysis and critical control point (HACCP)
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
  - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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UEERA0077 Resolve problems in transport refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair transport refrigeration systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of transport refrigeration systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of transport refrigeration systems.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in transport refrigeration systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools equipment and testing devices required for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Resolve problems in transport refrigeration systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, where necessary, in accordance with legislative, standard and code requirements and workplace procedures
	2.3 Problems are diagnosed using observations, measurements, calculations and comparisons with

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		normal operating values of systems and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in transport refrigeration systems must include at least the following:	• three operational problems related to transport refrigeration systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ116A Resolve problems in transport refrigeration systems.

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Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0077 Resolve problems in transport refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in transport refrigeration systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problem, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in transport refrigeration systems
- resolving problems in transport refrigeration systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- external power sources, including:
  - diesel/petrol engines

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    - dual power supplies
    - electrical
- maintenance schedules
- normal operating parameters of transport refrigeration systems
- operating and control principles of transport refrigeration systems
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
    - environmental and sustainable energy principles and practices
    - risk control measures
    - safe working practices
- relevant standards, codes and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records
- transport refrigeration systems, including:
    - applications
    - characteristics
    - components
    - construction
    - design features
    - typical layout arrangements.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0078 Resolve problems in ultra-low temperature refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to fault find and repair ultra-low temperature refrigeration systems, including compound and cascade systems.

It includes working safely and to legislative, industry standards and code requirements; using effective problem-solving techniques by applying knowledge of the components and operations of ultra-low temperature refrigeration systems; completing work and documenting solutions.

The skills and knowledge in this unit will be applied by refrigeration and air conditioning technicians during the service and repair of ultra-low temperature refrigeration systems

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to resolve problems in ultra-low temperature refrigeration systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with legislative, standard and code requirements and workplace procedures
	1.2 Hazards not previously identified are noted and risk control measures implemented
	1.3 Details of the problem are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and safety
2 Resolve problems in ultra-low temperature refrigeration systems	**2.1** Need to test or measure live work is determined in accordance with legislative, standard and code requirements and workplace procedures
	2.2 Circuits/machines/plant are checked as being isolated, where necessary, in accordance with legislative, standard and code requirements and workplace procedures

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	2.3	Problems are diagnosed using observations, measurements, calculations and comparisons with normal operating values of systems and components
	2.4	Information needed to resolve problems, including system specifications, 'as-installed' drawings, maintenance and service records, are obtained and evaluated against normal operating parameters
	2.5	Problems are resolved safely and with the approval of authorised person/s, as required
	2.6	Problems are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Justification for solutions used to resolve problems are documented in accordance with workplace procedures
	3.3	Completion of work tasks are documented and appropriate person/supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in ultra-low temperature refrigeration systems must include at least the following:

- three operational problems related to ultra-low temperature refrigeration systems
- one compound or one cascade system

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ117A Resolve problems in ultra-low

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temperature refrigeration systems.

Links

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Assessment Requirements for UEERA0078 Resolve problems in ultra-low temperature refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant legislations, industry standards, codes of practice and regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - hazard identification and reporting
  - implementing risk control measures
- completing work and documenting problem-solving activities and justification for the solutions used in ultra-low temperature refrigeration systems
- determining need to test or measure live work
- isolating circuits/machines/plant
- obtaining and assessing relevant information to resolve problems, including:
  - 'as-installed' drawings
  - maintenance and service records
  - system specifications
  - manufacturer specifications and manuals
- preparing to resolve problems in ultra-low temperature refrigeration systems
- resolving problems in ultra-low temperature refrigeration systems effectively
- using methodical fault-finding techniques
- using relevant tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- maintenance schedules
- normal operating parameters of ultra-low temperature refrigeration systems

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- operating and control principles of ultra-low temperature refrigeration systems
- relevant manufacturer specifications
- relevant measurements and calculations
- relevant risk mitigation processes, including:
  - environmental and sustainable energy principles and practices
  - risk control measures
  - safe working practices
- relevant standards, codes of practice and regulations
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- suitability of refrigerants for each application
- system faults and testing methods
- system specifications, 'as-installed' drawings, maintenance and service records
- ultra-low temperature refrigeration systems, including:
  - applications
  - characteristics
  - components
  - compound and cascade systems
  - construction
  - design features
  - typical layout arrangements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0079 Safely handle refrigerants and lubricants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to Safely handle refrigerants and lubricants used in refrigeration and air conditioning systems.

It includes relevant legislation applicable to the safe handling and storage of refrigerants and lubricants, types and common properties, identification of hazards, and safe filling of refrigerant cylinders.

The skills and knowledge of this unit of competency will be applied by refrigeration and air conditioning technicians during the installation, commissioning and repairing of refrigeration and air conditioning systems.

To undertake this unit, the learner must have a current Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to transfer/decant refrigerants and lubricants	**1.1** WHS/OHS hazards, risk control methods, relevant industry standards, codes of practice and legislation are obtained and applied in accordance with workplace procedures
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Work tasks are sequenced in accordance with job schedule and workplace procedures
	1.4 Supervisor is consulted to ensure work is coordinated with others in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to complete the work are obtained and checked for operational safety in accordance with workplace procedures
2 Transfer/decant refrigerants and lubricants	**2.1** Checks are carried out to ensure cylinders and/or containers employed in the refrigerant transfer and/or decanting process are fit for purpose and free of contaminants in accordance with workplace procedures and industry standards
	2.2 Calculations are performed to determine the safe filling capacity of the transfer/storage cylinder/container in accordance with workplace procedures and industry standards
	2.3 Refrigerants and lubricants are transferred/decanted safely using appropriate equipment, and the cylinders/containers are labelled in accordance with relevant codes of practice and industry standards
	2.4 Refrigerants and lubricants are transferred/decanted without waste of materials and damage to apparatus, the surrounding environment and services using relevant

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		sustainable energy practices in accordance with workplace procedures and industry standards
	2.5	Leaks are located and rectified using appropriate testing methods in accordance with relevant codes of practice and industry standards
3 Complete and report on transfer/decanting of refrigerants and lubricants	**3.1**	WHS/OHS work completion risk control measures are applied in accordance with workplace procedures
	3.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	3.3	Completion of work is documented in an auditable logbook and supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0079 Safely handle refrigerants and lubricants

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- determining the safe fill capacity of a refrigerant cylinder
- safely handle refrigerants in accordance with standards, codes and regulatory requirements
- documenting work, including refrigerant usage and removal
- implementing relevant legislation, industry standards, codes of practice and regulations
- testing for refrigerant leaks
- transferring and decanting refrigerant
- transferring lubricant.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria and includes knowledge of:

- compressor lubricant transferring equipment, procedures and requirements
- compressor lubricant types, applications, properties and safe handling
- decanting methods, including pressure differential, including pumping and temperature differential
- environmental impact of climate change, including global warming potential (GWP)
- environmental impact of ozone depletion, including ozone depletion potential (ODP)
- leak detection methods, equipment, procedures and requirements
- properties of an ideal refrigerant
- refrigerant cylinder requirements and safe handling, including recovery cylinders
- refrigerant properties, including classes, types and applications, boiling point, glide, composition, including components and safe handling, including flammability, toxicity and high pressure
- relevant legislation, industry standards, codes of practice and regulations
- relevant risk mitigation processes while handling refrigerants and lubricants, including

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potential hazards, risk control methods and safe working practices
- safe fill ratios and relevant calculations
- system contamination, prevention and removal, including types of contaminants and their effects on the operation of a system
- terms, including primary, secondary, expendable, pure, azeotropic, zeotropic, blends, bubble point, dew point and critical point.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0080 Select basic commercial refrigeration system equipment, components and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select commercial refrigeration system equipment, components and accessories.

It includes selecting commercial refrigeration system equipment and components, pipe work and controls. It also includes selecting refrigerant, condensing unit, evaporator, refrigerant controls, accessories, refrigerant and condensate pipe work, and system controls based on specifications, industry standards and manufacturer catalogues to determine calculated and deemed-to-comply solutions and documenting all selection information.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0081 Select refrigerant piping, accessories and associated controls

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

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UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Identify commercial refrigeration system equipment and components**	**1.1**	Extent and nature of refrigeration installation is determined from job specifications
		1.2	Refrigeration system safety and regulatory compliance requirements are identified and applied
2	**Develop refrigeration pipe work arrangements**	**2.1**	Location of refrigeration equipment is determined from regulatory requirements, job specifications and site drawings
		2.2	Refrigeration piping is arranged to ensure safe and functional operation of the system
		2.3	Pipe work is arranged to comply with technical industry standards, job specifications and requirements
3	**Select commercial refrigeration system equipment and components**	**3.1**	Pipe and tubing are selected for suitability for the commercial environments it is to be installed
		3.2	Pipe and tubing are sized to meet refrigeration parameters and capacity requirements for the refrigerant to be used
		3.3	Pipe and tubing quantities are determined from equipment location diagrams and job specifications
		3.4	Refrigeration system equipment and components are selected to meet load requirements based on calculated or deemed-to-comply solutions
		3.5	Refrigerant liquid expansion valves are selected to meet functional, specified and regulatory requirements
		3.6	Automatic control devices are selected to meet functional, specified regulatory requirements, current voltage and ingress protection (IP) ratings
		3.7	Evidence is obtained that the selected refrigeration equipment and components comply with job requirements and industry standards
4	**Document selection of system equipment and components**	**4.1**	Reasons for selections made including calculations are documented in accordance with workplace procedures

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4.2	Refrigeration installation arrangements and specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting commercial refrigeration system equipment and components, pipe work and controls must include at least the following:	• two different refrigeration systems, including:
	  • refrigerant
	  • condensing unit
	  • evaporator
	  • refrigerant controls
	  • accessories
	  • refrigerant and condensate pipe work
	  • system controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ190A Select basic commercial refrigeration system equipment, components and accessories.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0080 Select basic commercial refrigeration system equipment, components and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- arranging pipe work to comply with regulatory and functional requirements
- selecting appropriate type, size and quantity of pipe and tubing
- selecting refrigeration equipment and components that meets load requirements
- selecting automatic control devices that meet functional and regulatory requirements
- documenting pipe work arrangement, specification for items selected and reasons for the selections made
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- basic commercial refrigeration system equipment, components, accessories selection, piping selection, safe working practices and relevant standards, codes and regulations, including:
  - calculation of capacity in heat exchangers:
    - $Q = UA (LMTD)$
    - $Q = mc\Delta t$
    - $Q = m \Delta h$
  - evaporators:
    - commercial types and applications
    - coil bypass factor
    - effects of evaporator TD on space humidity

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    - effects of air circulation on product conditions
    - selection criteria and selection tables
- condensers:
    - commercial types and applications
    - effects of ambient conditions
    - condenser control
    - heat rejection factor
    - condenser TD
    - selection criteria and selection tables
- compressors:
    - types and applications
    - capacity
    - displacement
    - volume flow rate
    - theoretical capacity
    - total volumetric efficiency
    - effect of operating conditions, including suction pressure drop and superheating
    - actual capacity
    - power
    - theoretical requirement
    - effects of operating conditions
    - actual requirements
    - post defrost loads
    - pull down torque requirements, high, medium and low back pressure compressors
    - selection tables, motor selection
- refrigerant flow controls:
    - types, operation and applications
    - effects from sub-cooling
    - distributor types, operation and applications
    - selection tables
- system load balance point:
    - graphical representation
- line sizing and design:
    - quick selection tables
    - velocity tables
    - pressure drop in lines and fittings
    - oil migration stabilisation
    - refrigerant velocity
    - effect of varying system capacity

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    - oil traps
    - risers
    - liquid migration
- automatic controls:
    - fin spacing, suction temp to evaporator suction
    - hot-gas bypass valves
    - electronic control of valves programmable logic controller (PLC) control
    - refrigerant regulating valves
    - solenoid valves
    - condenser pressure regulating valves
    - evaporator pressure regulating valves
    - crankcase pressure regulating valves
    - cycling controls
    - pressure-stats
    - thermostats
    - defrost controls
    - monitoring and alarm controls
    - refrigeration automation systems
    - control strategies
    - control modes
- relevant industry standards, including industry practices and technologies
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0081 Select refrigerant piping, accessories and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select refrigerant piping, accessories and associated controls.

It includes selecting refrigerant piping, accessories and controls for refrigeration and air conditioning installation to comply with regulations, industry standards and specifications. It also includes developing refrigerant pipe work arrangements; selecting pipe work and fittings, refrigerant flow controls and accessories, and mechanical and electrical control devices based on specifications, industry standards and manufacturer catalogues to determine calculated and deemed-to-comply solutions and documenting selection information.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to select refrigerant piping, accessories and associated controls**	**1.1** Extent and nature of the refrigeration installation is determined from job specifications
		1.2 WHS/OHS and regulatory requirements of the refrigeration system are identified, obtained and applied
2	**Develop refrigerant pipe work arrangements**	**2.1** Intended location of refrigeration equipment is determined from job specifications and site drawings or deemed-to-comply arrangements
		2.2 Pipe work arrangements are developed to ensure safe and functional operation of the refrigerant system in accordance with workplace procedures
		2.3 Pipe work is arranged to comply with technical industry standards, job specifications and requirements
3	**Select refrigerant piping, accessories and associated controls**	**3.1** Suitable pipe and tubing are selected for the environment in which it is to be installed in accordance with industry standards
		3.2 Pipe and tubing are sized to meet refrigeration parameters and capacity requirements for the refrigerant to be used
		3.3 Pipe and tubing quantities are determined from equipment location diagrams and job specifications
		3.4 Refrigeration controls and accessories are selected to meet load requirements based on calculated or deemed-to-comply solutions
		3.5 Control devices are selected to meet functional and regulatory requirements
		3.6 Electrical control devices are selected to meet current voltage and ingress protection ratings in accordance with industry standards
		3.7 Evidence is obtained to confirm the selected refrigeration equipment and control devices comply with job requirements and industry standards
4	**Document refrigerant piping, accessories and associated controls selection**	**4.1** Refrigerant piping, accessories and associated control selections, including calculations, are documented in accordance with workplace procedures

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4.2 Refrigeration installation arrangement and specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting refrigerant pipe/tube, accessories and associated controls must include at least two different refrigeration systems and include the following:	• pipe sizes determined using recommended manufacturers specifications and the total equivalent length calculation methods refrigeration flow controls • isolation/access valves • filter-dryers • sight glasses • accessories • thermostats • pressure controls • humidity controls

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ110A Select refrigerant piping, accessories and associated controls.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0081 Select refrigerant piping, accessories and associated controls

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying environmental and sustainable principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - using personal protective equipment (PPE)
  - using risk control measures
- arranging pipe work to comply with regulatory and functional requirements
- completing relevant documentation
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- documenting pipe work arrangements, specifications for items selected and reasons for selections made
- preparing and selecting refrigerant piping, accessories and controls for refrigeration and air conditioning installations in accordance with system load and regulatory requirements, industry standards and workplace procedures, including:
  - planning the refrigerant pipe work route and arrangement in accordance with job specifications
  - reading and interpreting drawings and requirements related to the installation
  - selecting appropriate type, size and quantity of piping and tubing
  - selecting control devices that meet functional requirements
  - selecting refrigeration accessories that meets load requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigerant liquid and vapour flow control selection, including expansion valves, solenoids and pressure regulators

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- refrigerant piping layout and routing
- refrigerant piping sizing and accessories selection for suction, discharge and liquid lines
- refrigeration and air conditioning controls and capacity control selection, including pressure controls and thermostats
- relevant environmental and sustainable principles and practices, including:
  - environment protection
  - sustainable energy
  - sustainable resources
- relevant drawings and specifications, including:
  - control diagrams
  - equipment installation requirements
  - equipment layouts and drawings
  - equipment manufacturer specifications and symbols
  - job specifications
  - piping diagrams
  - site drawings
  - wiring diagrams
- relevant equipment, including software applications
- relevant industry standards, codes of practice and regulations
- relevant manufacturer instructions
- relevant problem-solving techniques
- relevant refrigerant piping, accessories and controls for refrigeration and air conditioning installations
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0082 Select residential air conditioning system equipment, components and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to select residential air conditioning system equipment, components and accessories.

It includes selecting residential air conditioning equipment, pipe work, air distribution components and controls. It also includes selecting the unitary air conditioning equipment and components, system controls, refrigerant and condensate pipe work based on specifications, industry standards and manufacturer catalogues to determine calculated and deemed-to-comply solutions and documenting all selection information.

The skills and knowledge described in this unit may, in some jurisdictions, require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

UEERA0038 Establish the thermodynamic parameters of refrigeration and air conditioning systems

UEERA0002 Analyse the psychrometric performance of HVAC/R systems

and

UEERA0003 Analyse the thermodynamic performance of HVAC/R systems

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

or

UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

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UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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		1.2	Air conditioning system safety and regulatory compliance requirements are identified and applied
2	**Develop compliance pipe work arrangements**	**2.1**	Location of air conditioning equipment is determined from regulatory requirements, job specifications and site drawings
		2.2	Air conditioning pipe work is arranged to ensure safe and functional operation of the system
		2.3	Air conditioning system pipe work is arranged to comply with technical industry standards, job specifications and requirements
3	**Select residential air conditioning system equipment and components**	**3.1**	Pipe and tubing are selected for suitability for the residential environments it is to be installed
		3.2	Pipe and tubing are sized to meet air conditioning parameters and capacity requirements for the refrigerant to be used
		3.3	Pipe and tubing quantities are determined from equipment location diagrams and job specifications
		3.4	Air conditioning unitary equipment and components are selected to meet load requirements based on calculated or deemed-to-comply solutions
		3.5	Air distribution components and controls are selected to meet functional, specified and regulatory requirements
		3.6	Automatic control devices are selected to meet functional, specified regulatory requirements, current voltage and IP ratings
		3.7	Evidence is obtained that the selected air conditioning equipment and components comply with job requirements and industry standards
4	**Document selection of system equipment and components**	**4.1**	Reasons for selections made, including calculations, are documented in accordance with workplace procedures
		4.2	Air conditioning installation arrangement and specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Selecting residential air conditioning equipment and components, pipe work, air distribution components and controls must include at least the following:	• two different air conditioning systems, including:
	  • unitary air conditioning equipment and components
	  • system controls
	  • refrigerant and condensate pipe work
	  • air distribution system and components

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ191A Select residential air conditioning system equipment, components and accessories.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0082 Select residential air conditioning system equipment, components and accessories

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- arranging pipe work to comply with regulatory and functional requirements
- selecting appropriate type, size and quantity of pipe and tubing
- selecting air conditioning unitary equipment and components that meets load requirements
- selecting air distribution components and controls that meets load requirements
- selecting automatic control devices that meet functional and regulatory requirements
- documenting pipe work arrangement, specification for items selected and reasons for the selections made
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- air conditioning system equipment, component selection, components and piping selection, safe working practices and relevant standards, codes and regulations, including:
  - residential air conditioning unitary equipment:
    - construction, operation, application and selection of:
      - room air conditioners
      - split systems – wall hang, cassettes and ducted
      - small package units
      - cooling only and reverse cycle
  - line sizing and design:
    - quick selection tables

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    - velocity tables
    - pressure drop in lines and fittings
    - oil migration stabilisation
    - effect of varying system capacity
    - oil traps
    - liquid migration
- control systems:
    - construction, operation, application and selection of:
        - cycling and safety controls
        - pressure-stats
        - thermostats
        - de-ice controls
        - air conditioning automation systems
        - control strategies
- air distribution:
    - principles:
        - factors affecting the design of ductwork systems
        - flexible ductwork systems
        - static, velocity and total pressure
    - pressure loss:
        - friction and dynamic
        - in ducts, friction charts
        - in fittings, loss coefficients
        - diffuser pressure loss
    - system sizing:
        - standard duct sizes and gauges
        - duct selection
        - fitting selection
        - air diffuser selection
        - balancing
- relevant industry standards, including industry practices and technologies
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0083 Service and repair microwave ovens

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service a microwave oven.

Competency in this unit requires the ability to work safely, apply knowledge of servicing and repairing microwave ovens, test appliance functions, locate and rectify faults and defective components, and complete required service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to service microwave oven	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be completed is determined from service and fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from supervisor to ensure work is coordinated with others
	1.4 Sources of materials and parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices are obtained in accordance with workplace procedures and checked for operational safety
2 Service microwave oven	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures are implemented in accordance with workplace procedures and in consultation with appropriate person/s
	2.4 Appliance is tested and components are inspected for wear or defect in accordance with workplace procedures and manufacturer specifications
	2.5 Appliance faults and their cause are identified using measured and calculated values of appliance parameters in accordance with workplace procedures
	2.6 Appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage in accordance with workplace procedures
	2.7 Defective, worn or faulty appliance components are rechecked and their status is confirmed
	2.8 Replacement parts are obtained in accordance with

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		workplace procedures
	2.9	Effectiveness of repair work is tested in accordance with workplace procedures
	2.10	Microwave oven is reassembled, given a final test and prepared for return to service
	2.11	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12	Servicing activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing microwave ovens must include at least the following:	• two microwave ovens
	• four defects/faults:
	  • higher energy use than previously experienced
	  • not heating
	  • appliance light not working
	  • electric shock received from appliance cabinet

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ173A Service and repair microwave ovens.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0083 Service and repair microwave ovens

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - using risk control measures
- completing and reporting fault-finding and repair activities
- implementing legislation, industry standards, codes of practice and regulations
- preparing to service microwave oven
- servicing microwave oven, including:
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining work from service request
  - finding faults
  - identifying defective components affecting appliance
  - rectifying defects/faults
  - testing appliance functions
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- service microwave oven, including:
  - auto cook facilities
  - microwave cooking basics

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  - microwave oven performance
  - power control systems
  - service, fault finding and repair
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - potential hazards
  - risk control measures
  - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0084 Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service and repair self-contained air conditioning and refrigeration systems using Class A2, A2L and A3 flammable refrigerants.

It includes servicing and repairing self-contained air conditioning and refrigeration equipment using flammable refrigerant. It also includes working safely; applying refrigeration principles that apply to flammable refrigerant; following service manuals; testing, locating and rectifying faults and defective components; and completing necessary service documentation.

Some flammable refrigerants, for example, fluorocarbons like R32, are controlled under the national Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995. Therefore, to undertake this unit, the learner must have a relevant Trainee Refrigerant Handling Licence if it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence if it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEERA0053 Install, commission, service and maintain medium temperature systems

UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

or

UEERA0089 Service refrigeration appliances

UEERA0007 Apply safety awareness and legal requirements for flammable refrigerants

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service and repair flammable refrigerants refrigeration and air conditioning systems	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Hazards not previously identified are reported and advice on risk control measures sought from supervisor
	1.3 Details of the work are obtained from documentation and/or from supervisor to determine the scope of work to be completed
	1.4 Advice is sought from supervisor, as required, to ensure work is coordinated effectively with others
	1.5 Materials required for the work are identified and obtained in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for the work are obtained and checked for correct operation and

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		safety in accordance with workplace procedures
2 Repair and service flammable refrigerants refrigeration and air conditioning systems	**2.1**	Measuring system operating parameters are conducted in accordance with WHS/OHS requirements and workplace safety procedures
	2.2	Checks are conducted to ensure system/component parts are isolated, as required, in accordance with workplace procedures and WHS/OHS requirements
	2.3	Refrigerant is removed from system safely in accordance with relevant legislation, standards and code requirements, manufacturer instructions and workplace procedures
	2.4	Pressure testing is conducted and precautions taken to prevent damage to components in accordance with workplace procedures and WHS/OHS requirements
	2.5	Pressure testing is conducted at a pressure compatible with flammable refrigerants in accordance with industry standards and WHS/OHS requirements
	2.6	System leaks are located and rectified using testing methods appropriate to the system in accordance with industry standards and workplace procedures
	2.7	System is evacuated for an operational flammable refrigerant system in accordance with relevant industry standards and workplace procedures
	2.8	System is charged safely with flammable refrigerants and compatible lubricants in accordance with relevant legislation, standards and code requirements, manufacturer instructions and workplace procedures
	2.9	Actual and specified range of operating conditions are determined from measured and calculated values as they apply to flammable refrigerants vapour compression systems in accordance with workplace procedures and industry standards
	2.10	Methods for dealing unplanned situations are discussed, as required, with relevant person/s for approval and documented in accordance with workplace procedures
	2.11	Operating conditions are determined without damage to apparatus, circuits, the surrounding environment and/ or

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		services using sustainable energy practices
3 Complete and report servicing and repairing flammable refrigerants refrigeration and air conditioning systems	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Contaminated refrigerant and lubricant are dealt with in accordance with legislative/regulatory and industry standards and requirements
	3.3	Operation conditions are documented and include identification of any parameter that is not within the specified range for the system
	3.4	Work supervisor is notified of work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing and repairing self-contained A2, A2L and A3 flammable refrigerant air conditioning and refrigeration systems must include at least the following:	• determining operating conditions using measurement and basic calculation methods, including suction and discharge pressures; ambient, evaporator and condensing temperatures; and evaporator and condenser temperature differences • recovering refrigerant, replacing components, testing pressure, evacuating, charging and leak testing a flammable refrigerant system in a safe and environmentally responsible manner • one self-contained flammable refrigerant air conditioning or refrigeration system

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ175A Service and repair self contained hydrocarbon air conditioning and refrigeration systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0084 Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- charging the system with the appropriate type and quantity of flammable refrigerants
- completing documentation
- completing work and reporting on servicing and repairing flammable refrigerants refrigeration and air conditioning systems
- conducting pressure testing at the appropriate pressure level and without damaging components
- dealing with unplanned events
- evacuating the system to the required standard and using appropriate vacuum measuring instruments
- locating and rectifying leaks
- obtaining and recording measurements
- preparing to service and repair flammable refrigerants refrigeration and air conditioning systems
- removing and storing refrigerant correctly
- selecting appropriate materials and equipment
- servicing and repairing flammable refrigerants refrigeration and air conditioning systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- charging requirements and procedures
- compressor lubricant types, applications and safe handling
- evacuation requirements and procedures

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- flammable refrigerant (A2, A2L and A3) types, applications, dangers, safe handling, storage and transport
- flammable refrigerant refrigeration and air conditioning systems, components and operating conditions
- leak detection requirements and procedures
- pressure testing requirements and procedures
- refrigerant removal/recovery and flushing requirements and procedures
- relevant job safety assessments or risk mitigation processes
- relevant legislation, industry standards and codes of practice, including hazards associated with flammable refrigerants
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- system access tools and procedures
- tube joining tools and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0085 Service clothes washing machines and dryers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service clothes washing machines and dryers.

It includes working safely, testing appliance functions, locating and rectifying clothes washing machine and dryer faults and defective components, and completing required service documentation.

Individuals will typically work independently to service and repair clothes washing machines and dryers.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service clothes washing machine and dryer	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Extent of work to be undertaken is determined from service/fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from supervisor to ensure work is coordinated with others
	1.4 Sources of materials/parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Service clothes washing machine and dryer	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures implemented in accordance with workplace procedures and consultations with appropriate person/s
	2.4 Appliance is tested and components are inspected for wear or defects in accordance with workplace procedures and manufacturer specifications
	2.5 Appliance faults and their cause are identified using measured and calculated values of appliance parameters in accordance with workplace procedures
	2.6 Appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage in accordance with workplace procedures

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	2.7	Defective, worn or faulty appliance components are rechecked and their status is confirmed
	2.8	Replacement parts are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of repair work is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.11	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12	Servicing activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing clothes washing machines and dryers must include at least the following:	• two types of appliances:
	  • washing machines (top load/front load, twin tub or washer/dryer combination)
	  • dryers (washer/dryer combination or

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tumble/static)
- four defects/faults:
  - washing machines:
    - higher energy use than previously experienced
    - program selector not working correctly
    - appliance light not working
    - electric shock received from appliance cabinet
  - dryers:
    - heater not operating
    - fan not working
    - timer not working correctly
    - electric shock received from appliance cabinet

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ156A Service clothes washing machines and dryers.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0085 Service clothes washing machines and dryers

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - using risk control measures
- completing and reporting fault-finding and repair activities
- implementing legislation, industry standards, codes of practice and regulations
- preparing to service clothes washing machine and dryer
- servicing clothes washing machine and dryer, including:
  - determining nature of work from service request
  - identifying defective components affecting appliance efficiency
  - finding faults
  - rectifying defects or faults
  - testing appliance functions
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:

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  - potential hazards
  - risk control measures
  - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- service clothes washing machines and dryers, including:
  - component repair or replacement methods
  - installation
  - manufacturer parts catalogues and service reports
  - operational testing and set-up procedures encompassing pre-start and safety control checking, operating cycle testing and control adjustments
  - types, applications, construction, components and operating characteristics
  - typical component wear or defects
  - typical faults.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0086 Service dishwasher machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service a dishwashing machine.

Competency in this unit requires the ability to work safely, apply knowledge of dishwashing machines, test appliance functions, locate and rectify faults and defective components, and complete all required service documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to service dishwashing machine	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be completed is determined from service and fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought from supervisor to ensure work is coordinated with others
	1.4 Sources of materials and parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Service dishwashing machine	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures implemented in accordance with workplace procedures and in consultation with appropriate person/s
	2.4 Appliance is tested and components are inspected for wear or defects in accordance with workplace procedures and manufacturer specifications
	2.5 Appliance faults and their cause are identified using measured and calculated values of appliance parameters in accordance with workplace procedures
	2.6 Appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage in accordance with workplace procedures
	2.7 Defective, worn or faulty appliance components are rechecked, and their status is confirmed
	2.8 Replacement parts are obtained in accordance with

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		workplace procedures
	2.9	Effectiveness of repair work is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.11	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12	Servicing activities are completed, without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing dishwashing machines must include at least the following:	• two types of dishwashers:
	  • automatic
	  • side load
	  • front load
	  • semiautomatic
	• four defects/faults:
	  • electric shock received from appliance cabinet

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- not enough or too much water entering machine
- no wash cycle
- no rinse cycle
- heater not operating
- timer not working correctly

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ158A Service dishwasher machines.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0086 Service dishwasher machines

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - using risk control measures
- completing and reporting fault-finding and repair activities
- implementing legalisation, industry standards, codes of practice and regulations
- preparing to service dishwashing machine
- servicing dishwashing machine, including:
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining work from service request
  - finding faults
  - identifying defective components affecting appliance
  - rectifying defects/faults
  - testing appliance functions
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- service dishwashing machines, including:
  - faulty component repair or replacement methods
  - manufacturer parts catalogue and service reports

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    - regular faults
    - types, applications, construction, components and operating characteristics
    - typical component wear or defects
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
    - potential hazards
    - risk control measures
    - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0087 Service electrical heating appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service an electrical heating appliance.

Competency in this unit requires the ability to work safely, apply knowledge of electric heating appliances, test heating appliance functions, locate and rectify faults and defective components, and complete all required service documentation.

Individuals will typically work independently to service and repair electric heating appliances.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service electrical heating appliance	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be undertaken is determined from service and fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from supervisor to ensure work is coordinated with others
	1.4 Sources of materials/parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and are checked for operational safety
2 Service electrical heating appliance	**2.1** Need to test or measure live work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures implemented in accordance with workplace procedures and in consultation with appropriate person/s
	2.4 Appliance is tested and components are inspected for wear or defects in accordance with workplace procedures and manufacturer specifications
	2.5 Appliance faults and their cause are identified using measured and calculated values of appliance parameters in accordance with workplace procedures
	2.6 Appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage in accordance with workplace procedures
	2.7 Defective, worn or faulty appliance components are rechecked and their status is confirmed

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	2.8 Replacement parts to rectify defects/faults are obtained in accordance with workplace procedures
	2.9 Effectiveness of repair work is tested in accordance with workplace procedures
	2.10 Apparatus is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.11 Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12 Servicing activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1** Work area is cleaned and made safe in accordance with workplace procedures
	3.2 Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing electrical heating appliances must include at least the following:	• two appliances:
	  • electric stoves
	  • ovens
	  • hot plates
	  • ranges
	  • electrical space heaters

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- hot water systems
- three defects/faults:
  - heater not operating
  - fan not working
  - timer not working correctly
  - electric shock received from appliance cabinet

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ157A Service electrical heating appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0087 Service electrical heating appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - using risk control measures
- completing and reporting fault-finding and repair activities
- implementing legislation, industry standards, codes of practice and regulations
- preparing to service electrical heating appliances
- servicing electrical heating appliance, including:
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining nature of work from service request
  - finding faults
  - identifying defective components affecting appliance
  - rectifying defects/faults
  - testing appliance functions
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- service electrical heating appliances, including:
  - faulty components repair or replacement methods
  - heating circuits and controls

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    - heating principles and applications encompassing resistance, induction and microwave
    - manufacturer parts catalogues and service reports
    - types of heating appliances, their operating principles and characteristics, including ovens, cook tops, space heaters but excluding microwave ovens
    - typical faults
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
    - potential hazards
    - risk control measures
    - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0088 Service gas heating appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service a gas heating appliance.

Competency in this unit requires the ability to work safely, apply knowledge of gas heating appliances, test appliance functions, locate and rectify faults and defective components, and complete all required service documentation.

Individuals will typically work independently to service and repair gas heating appliances.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service gas heating appliance	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be completed is determined from service and fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from supervisor to ensure work is coordinated with others
	1.4 Sources of materials/parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Service gas heating appliance	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Heating appliance is checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures implemented in accordance with workplace procedures and in consultation with appropriate person/supervisor
	2.4 Heating appliance is tested and components are inspected for wear or defects in accordance with workplace procedures and manufacturer specifications
	2.5 Heating appliance faults and their cause are identified using measured and calculated values of appliance parameter in accordance with workplace procedures
	2.6 Heating appliance is dismantled, where necessary, and parts safely stored to protect them against loss or damage, in accordance with workplace procedures
	2.7 Defective, worn or faulty appliance components are rechecked and their status is confirmed

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	2.8	Replacement parts are obtained in accordance with workplace procedures
	2.9	Effectiveness of repair work is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.11	Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12	Servicing activities are completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Servicing heating appliances must include at least the following:	• two gas heating appliances:
	  • stoves
	  • ovens
	  • hot plates
	  • ranges
	  • space heaters
	  • hot water systems

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- four defects/faults:
  - no pilot flame
  - no main jet ignition
  - not hot enough
  - timer not working correctly
  - electric shock received from appliance cabinet
  - gas leaking

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ159A Service gas heating appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0088 Service gas heating appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying legislation, industry standards, codes of practice and regulations
- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - identifying hazards
  - implementing safe working practices
  - using risk control measures
- completing and reporting fault-finding and repair activities
- preparing to service gas heating appliances
- servicing gas heating appliance, including:
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining nature of work from service request
  - finding faults
  - identifying defective components affecting appliance
  - rectifying defects/faults
  - testing appliance functions
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:

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  - potential hazards
  - risk control measures
  - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- service gas heating appliances, including:
  - component repair or replacement methods
  - manufacturer parts catalogues and service reports
  - types, applications, construction, components and operating characteristics of gas heating appliances encompassing ovens, cook tops and space heaters
  - typical component wear or defects
  - typical faults.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0089 Service refrigeration appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service refrigeration appliances operating on flammable and non-flammable refrigerants.

It includes working safely, locating and rectifying refrigeration appliance faults and defective components, and completing required service documentation.

Individuals will typically work independently to service and repair domestic refrigeration appliances.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit may require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service refrigerated appliance	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Extent of work to be completed is determined from service and fault requests and/or discussions with supervisor/appropriate person/s in accordance with workplace procedures
	1.3 Advice is sought, as required, from supervisor to ensure work is coordinated with others
	1.4 Sources of materials and parts required for work are identified in accordance with workplace procedures
	1.5 Tools, equipment and testing devices to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Service refrigerated appliance	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Appliance is checked as being isolated, where necessary, in accordance with workplace procedures and WHS/OHS requirements
	2.3 Safety hazards resulting from defect or fault are identified and documented, and risk control measures are implemented in accordance with workplace procedures and in consultation with appropriate person/s
	2.4 Appliances are tested and components are inspected for wear or defects in accordance with workplace procedures, manufacturer specifications and industry codes of practice

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	2.5 Appliance faults, and their cause, are identified using measured and calculated values of appliance parameters in accordance with workplace procedures
	2.6 Appliance is dismantled, where necessary, and parts are safely stored to protect them against loss or damage in accordance with workplace procedures
	2.7 Defective, worn or faulty appliance components are rechecked and their status is confirmed
	2.8 Replacement parts to rectify defects/faults are obtained in accordance with workplace procedures
	2.9 Effectiveness of repair work is tested in accordance with workplace procedures
	2.10 Appliance is reassembled, given a final test and prepared for return to service in accordance with workplace procedures
	2.11 Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.12 Servicing of refrigerated appliance is completed without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report fault-finding and repair activities	**3.1** Work area is cleaned and made safe in accordance with workplace procedures
	3.2 Service report is completed and verified by an appropriate person/supervisor in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing refrigerated appliances must include at least the following:	• appliances using flammable and non-flammable refrigerants
	• two types of appliances:
	  • single door refrigerators
	  • two door refrigerators or freezers
	  • single door freezers either cyclic defrost or frost free
	• four defects/faults:
	  • higher energy use than previously experienced
	  • not cold enough
	  • appliance ices up
	  • appliance light not working
	  • electric shock received from appliance cabinet

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ155A Service refrigeration appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0089 Service refrigeration appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - applying safe working practices
  - identifying hazards
  - using risk control measures
- completing and reporting fault-finding and repair activities
- implementing legalisation, industry standards, codes of practice and regulations
- preparing to service refrigerated appliance
- servicing refrigerated appliances, including:
  - completing service report
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining work from service request
  - finding faults
  - flammable and non-flammable refrigerants
  - identifying defective components affecting appliance
  - rectifying defects or faults
  - testing appliance functions
- using manufacturer specifications and manuals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- flammable and non-flammable refrigerants
- service appliance refrigeration systems, including:

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  - appliance refrigeration systems
  - capillary systems
  - major electrical refrigeration appliances, including refrigerators and freezers
  - operational principles of major domestic appliances that use electrical, gas and/or water services that incorporate refrigeration
  - operational testing and set-up procedures
  - retrofitting of domestic refrigeration systems
- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - potential hazards
  - risk control measures
  - safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0090 Service room air conditioners

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service room air conditioners.

This unit covers maintaining the effective and efficient operation of self-contained room air conditioners. It includes working safely, applying knowledge of room air conditioners, following service manuals, testing appliance function, locating and rectifying faults and defective components, and completing the necessary service documentation.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service room air conditioner	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Extent of air conditioner work to be undertaken is determined from service/fault request and/or discussions with appropriate person/s
	1.3 Advice is sought from work supervisor to ensure servicing work is coordinated effectively with others
	1.4 Sources of materials/parts required for the servicing work are determined in accordance with workplace procedures
	1.5 Tools, equipment and testing devices needed to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Service room air conditioner	**2.1** Need to test or measure live work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures
	2.2 Air conditioner appliance is inspected, checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Safety hazards resulting from air conditioner defect or fault are documented and risk control measures devised and implemented in consultation with appropriate person/s

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	2.4	Air conditioner appliances are tested for efficient operation and components affecting efficiency are inspected for wear or defects in accordance with industry standards, manufacturer service manuals and industry codes of practice
	2.5	Air conditioner appliance faults and their cause are determined through the application of refrigerated appliances and using measured and calculated values of appliance parameters
	2.6	Air conditioner appliance is dismantled, as required, and parts stored to protect against loss or damage
	2.7	Defective worn or faulty air conditioner appliance components are rechecked and their status confirmed
	2.8	Replacement parts required to rectify defects/faults are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of the repair is inspected and tested in accordance with workplace procedures
	2.10	Air conditioner apparatus is reassembled, tested and prepared for return to service
	2.11	Unplanned situations are dealt with safely in accordance with workplace procedures and with the approval of authorised person/s in a manner that minimises risk to personnel and equipment
	2.12	Servicing activities are carried out without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	Work area is cleaned and made safe in accordance with workplace procedures
	3.2	Service report is completed and verified by appropriate person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Servicing self-contained room air conditioners must include at least the following:

- two types of room air conditioners
- four of the following defects/faults:
  - higher energy use than previously experienced
  - not cooling/heating enough
  - fan not operating
  - appliance noisy
  - electric shock received from appliance cabinet

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ189A Service room air conditioners.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0090 Service room air conditioners

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (WHS/OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing service report accurately
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining the nature of the work from service request
- finding faults efficiently
- identifying defective components affecting appliance efficiency
- rectifying defects/faults effectively
- servicing room air conditioners
- testing appliance functions effectively.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- component repair/replacement methods
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications, including parts catalogues and service reports
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- self-contained room air conditioners, including types, applications, construction, components and operating characteristics
- typical component wear or defects
- typical faults.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0091 Service small electrical appliances and power tools

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to service small electrical appliances and hand power tools.

It includes working safely, servicing small appliances and power tools, testing appliance functions, locating and rectifying faults and defective components, and completing required service documentation.

Individuals will typically work under supervision as part of a specialist workshop and repair team.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to service small electrical appliance and power tools	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied in accordance with workplace procedures
	1.2 Repair work details are obtained from documentation and/or supervisor to determine scope of work to be completed
	1.3 Advice is sought from supervisor to ensure work is coordinated with others
	1.4 Sources of materials required for work are accessed in accordance with workplace procedures
	1.5 Tools, apparatus and testing devices needed to carry out the work are obtained and checked for operational safety
2 Service small electrical appliance and power tools	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Circuits and/or apparatus are checked and isolated in accordance with workplace procedures and WHS/OHS requirements
	2.3 Apparatus is dismantled in accordance with workplace procedures, manufacturer specifications and/or supervisor's instructions
	2.4 Component parts are tagged during dismantling to ensure reassembly, and are stored safely to protect against loss or damage
	2.5 Repairs are completed without damage to other components, apparatus or circuits in accordance with workplace procedures
	2.6 Apparatus is assembled in sequence with all parts placed securely and connected in accordance with workplace procedures and manufacturer specifications
	2.7 Unplanned events are responded to in accordance with workplace procedures and referred to supervisor for

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		direction, as required, in a manner that minimises risk to personnel and equipment
	2.8	Electrical appliance or power tool repairs are completed without waste of materials or damage to apparatus, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete and report service work activities	**3.1**	Repaired apparatus is forwarded to appropriate person/s for testing in accordance with workplace procedures
	3.2	Work area is cleaned and made safe in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Servicing small electrical appliance and power tools must include the following:	• at least two small appliances:
	  • toasters
	  • garbage disposal units
	  • food mixer/processors
	  • small heating appliances (hair dryers)
	  • range hoods
	• at least two hand power tools:
	  • drills (pistol, hammer and cordless)
	  • circular saws
	  • mitre saws
	  • routers
	  • sanders
	  • grinders
	  • planers
	  • cut off machines
	  • heat guns
	• removing at least three different types of

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components

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ151A Service small electrical appliances and power tools.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0091 Service small electrical appliances and power tools

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying legislation, industry standards, codes of practice and regulations
- applying relevant work, health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - using risk control measures
  - implementing safe working practices
- completing and reporting service work activities
- preparing to service small electrical appliances and power tools
- servicing small electrical appliances and power tools, including:
  - following manufacturer service instructions for access to components
  - removing at least three different types of components
  - replacing components to manufacturer requirements
  - terminating internal wiring
  - reassembling apparatus
  - testing apparatus operation
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- servicing small electrical appliances and hand power tools, including:
  - types, applications, operating principles and characteristics
  - motors and drive mechanisms
  - control and over current protection methods and devices
  - typical hand power tool faults

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- relevant legislation, industry standards, codes of practice and regulations
- relevant manufacturer specifications
- relevant risk mitigation processes, including:
  - safe working practices
  - potential hazards
  - risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in low voltage (LV) refrigeration and air conditioning circuits, determine the correct operation of LV alternating current (a.c.) circuits, and provide solutions to refrigeration and air conditioning work functions.

Competency in this unit requires the ability to work safely; use voltage, current and resistance measuring devices; and provide solutions derived from measurements and calculations to predictable problems in single and multiple path circuits.

Individuals will typically work independently or as part of a refrigeration installation and repair team.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on LV refrigeration and air conditioning circuits	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed
	1.3 Supervisor is consulted to ensure work is coordinated with others
	1.4 Tools, equipment and testing devices required to locate faults are obtained in accordance with workplace procedures and checked for operational safety
2 Solve problems in LV refrigeration and air conditioning circuits	**2.1** Need to test or measure live electrical work is determined in accordance with workplace procedures and WHS/OHS requirements
	2.2 Equipment is checked and isolated as required in accordance with workplace procedures and WHS/OHS requirements
	2.3 Measured and calculated values are used to resolve circuit problems, as they apply to single and multiple path electrical circuits in accordance with workplace procedures
	2.4 Repair work is carried out in accordance with equipment or manufacturer requirements and workplace procedures
	2.5 Unexpected situations are resolved in accordance with workplace procedures, safety guidelines and with the approval of an authorised person/supervisor
	2.6 Fault-finding and repair activities are resolved without damage to apparatus, circuits, the surrounding environment and/or services using relevant sustainable energy practices in accordance with workplace procedures
3 Complete work and document activities	**3.1** Worksite and equipment are cleaned and made safe in accordance with workplace procedures

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3.2 Supervisor is notified of completion of work and relevant documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in LV refrigeration and air conditioning circuits must include at least the following:

- single source series and a.c. circuits
- single source parallel and a.c. circuits

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ194A Solve problems in low voltage refrigeration and air conditioning circuits.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- altering an existing circuit to comply with specified function and operating parameters
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including hazards and control measures
- completing work and documentation
- developing a circuit to comply with a specified function and operating parameters
- preparing to work on low voltage (LV) refrigeration and air conditioning circuits
- solving problems in single and multiple alternating current (a.c) circuits
- using meters/testers to check for continuity, insulation resistance and obtain resistance, voltage, current and capacitance values.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- circuit protection and isolation
- devices used for circuit protection and circuit isolation, including fuses, circuit breakers, residual current devices (RCDs) and over/under voltage
- factors affecting resistance
- impedance
- parallel circuits and calculating equivalent circuit resistance and current
- power
- relevant standards, codes of practice and regulations
- single phase a.c.
- three phase a.c.
- types of magnetic devices, including relays, contractors, solenoids, transformers and motors
- types of meters/testers suitable for measuring capacitance
- types of meters/testers suitable for measuring current flow

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- types of meters/testers suitable for measuring insulation resistance
- types of meters/testers suitable for measuring resistance values and circuit conductivity
- types of meters/testers suitable for measuring voltage
- types, uses and safety considerations of capacitors used in the refrigeration and air conditioning industry
- types, uses, and construction of transformers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0093 Verify functionality and compliance of appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify functionality and compliance of electrical refrigeration/air conditioning appliances.

It includes testing and visually inspecting electrical refrigeration/air conditioning appliance to verifying that it is safe and complies with requirements. It also includes following procedures for conducting safety and functionality tests, conducting visual inspections, identifying non-compliance defects, documenting results and recommendations, and initiating the rectification of any defect.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-requisite Unit

UEECO0004 Participate in appliance servicing work and competency development activities

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0091 Service small electrical appliances and power tools

UEERA0044 Find and rectify faults in single phase motors and associated controls

UEERA0043 Find and rectify faults in appliance control systems and devices

UEERA0089 Service refrigeration appliances

UEERA0085 Service clothes washing machines and dryers

UEERA0063 Recover, pressure test, evacuate, charge and leak test refrigerants - appliances

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERA0037 Establish the basic operating conditions of vapour compression systems - appliances

UEERE0001 Apply environmentally and sustainable procedures in the energy sector

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to verify functionality and compliance of electrical appliance	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards which have not been previously identified are noted and established risk control measures implemented
	1.3 Appropriate person/s is consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.4 Inspection and tests are appropriately sequenced in accordance with job schedule
	1.5 Materials needed for tests and verification are obtained in accordance with workplace procedures and checked against job requirements
	1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Visually inspect appliances	**2.1** Electrical appliances are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Accessories and components are validated as being appropriately rated and meeting functional requirements
	2.3 Evidence that equipment complies with safety and functional requirements is identified and documented
	2.4 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.5 Electrical appliance inspection is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Conduct electrical appliance tests	**3.1** Testing or measuring on live electrical appliance and operating system is conducted in accordance with WHS/OHS requirements and workplace procedures

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	3.2 Appliance is checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3 Electrical tests are conducted to verify that the appliance electrical circuit within the appliance is safe and functions as intended
	3.4 Refrigeration/air conditioning tests are conducted to verify that the refrigeration/air conditioning components and pipe work within the appliance are safe and functions as intended
	3.5 Testing is carried out efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
4 Report inspection and verification findings	**4.1** Appliance is cleaned and made safe in accordance with established procedures
	4.2 Non-compliance defects are identified and reported in accordance with established procedures
	4.3 Recommendations for rectifying defects are made in accordance with established procedures
	4.4 Work completion is documented and appropriate person/s notified in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying functionality and compliance of air conditioner/refrigeration system appliances must include at least the following:	• two types of appliances, including: • conducting visual inspection of appliances • conducting all electrical tests

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	• conducting all refrigeration tests
Electrical testing must include at least the following:	• isolation testing • insulation resistance of equipment • resistance of the internal circuits of equipment • polarity of supply and equipment • continuity of earthing • correct electrical connections load current
Refrigeration/air conditioning testing must include at least the following:	• pressure test apparatus/circuits • leak test apparatus/circuits • evacuation test apparatus/circuits • compressor efficiency • controls tests • refrigerant charge • operating pressures • system operation system capacity

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ161A Verify functionality and compliance of appliances.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0093 Verify functionality and compliance of appliances

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using of risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- verifying compliance and functionality of electrical refrigeration/air conditioning appliances, including:
  - acting within regulatory limits
  - conducting electrical tests safely and correctly
  - conducting refrigeration/air conditioning tests safely and correctly
  - identifying non-compliant defects from test results
  - identifying visual defects
  - recommending appropriate corrective actions
  - reporting electrical inspection and verifying findings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- mandatory testing and verification requirements
- refrigeration/air conditioning appliance efficiency
- refrigeration/air conditioning appliance electrical testing techniques, including testing and compliance verification methods
- relevant refrigeration/air conditioning appliance manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- visual inspection methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify the functionality and compliance of refrigeration and air conditioning installations.

It includes testing and visual inspection for verifying that a refrigeration and air conditioning system and components are safe and complies with requirements and functions as intended. It also includes working safely, conducting compliance tests, conducting visual inspections, identifying non-compliance defects and completing mandatory reporting requirements. Individuals will typically work remotely without direct supervision or as part of a commissioning, service or maintenance team.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning or electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Those holding the Full Refrigeration and Air Conditioning Refrigerant Handling Licence issued by the Australian Refrigeration Council, or a Certificate III in Refrigeration and Air-conditioning trade qualification or equivalent meet the requirements of this unit and its prerequisite requirements.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEECO0010 Participate in refrigeration and air conditioning work and competency development activities

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERA0044 Find and rectify faults in single phase motors and associated controls

UEERA0045 Find and rectify faults in three phase motors and associated controls

UEERA0059 Prepare and connect refrigerant tubing and fittings

UEERA0036 Establish the basic operating conditions of vapour compression systems

UEERA0035 Establish the basic operating conditions of air conditioning systems

UEERA0050 Install refrigerant pipe work, flow controls and accessories

UEERA0081 Select refrigerant piping, accessories and associated controls

UEERA0031 Diagnose and rectify faults in air conditioning and refrigeration control systems

UEERA0092 Solve problems in low voltage refrigeration and air conditioning circuits

UEERA0079 Safely handle refrigerants and lubricants

UEERA0062 Recover and charge refrigerants

UEERA0053 Install, commission, service and maintain medium temperature systems

UEERA0052 Install, commission, service and maintain low temperature systems

UEERA0051 Install, commission, service and maintain air conditioning systems

UEERE0001 Apply environmentally and sustainable procedures in the energy sector

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to verify refrigeration and air conditioning installation	**1.1** WHS/OHS hazards, risk control methods, relevant standards, codes and legislation are obtained and applied
	1.2 Safety hazards which have not previously been identified are noted on job safety assessment and established risk control measures implemented
	1.3 Appropriate person/s is consulted to ensure the verification work is coordinated effectively with others involved on the worksite
	1.4 Location of refrigeration and air conditioning system components are determined from specifications and diagrams
	1.5 Refrigeration and air conditioning inspection and tests are appropriately sequenced in accordance with job schedule
	1.6 Materials needed for the tests and verification are obtained in accordance with workplace procedures and checked against job requirements
	1.7 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Visually inspect the refrigeration and air conditioning installation	**2.1** Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures

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	2.2	Pipe work is checked for appropriate type and size
	2.3	Pipe work accessories and components are validated as being suitably located, securely fixed and suitably protected from damage or corrosion
	2.4	Refrigeration and air conditioning system components and accessories are validated as being appropriately rated in accordance with manufacturer and design specifications
	2.5	Evidence that equipment complies with safety and functional requirements is cited in accordance with workplace procedures
	2.6	Unexpected situations are responded to in a manner that minimises risk to personnel and equipment, discussed with appropriate person/s and documented in accordance with workplace procedures
	2.7	Visual inspection is carried out efficiently without waste of materials, damage to or contamination of apparatus and the surrounding environment or services using sustainable energy practices
3 Conduct refrigeration and air conditioning compliance tests	**3.1**	Testing or measuring on live electrical work and operating system is conducted in accordance with WHS/OHS requirements and workplace safety procedures
	3.2	Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
	3.3	Electrical tests are conducted to verify that the electrical circuit within the refrigeration and air conditioning installation is safe and functions as intended
	3.4	Refrigeration and air conditioning tests are conducted to verify that the refrigeration equipment and pipe work within the refrigeration installation is safe and functions as intended
	3.5	Unexpected situations are responded in a manner that minimises risk to personnel and equipment, discussed with appropriate person/s and documented in accordance with workplace procedures
	3.6	Refrigeration/air conditioning testing is carried out

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		efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
4 Report refrigeration and air conditioning inspection and verification findings	**4.1**	Worksite and equipment are cleaned and made safe in accordance with established procedures
	4.2	Non-compliance defects are identified and reported in accordance with workplace procedures
	4.3	Recommendations for rectifying defects are made in accordance with workplace procedures
	4.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Inspecting, testing and verifying the functionality and compliance of refrigeration and air conditioning systems must include at least two of the following systems:

- cool rooms/freezer rooms
- merchandising and display cabinets
- residential air conditioning
- package air conditioning

Verification must include conducting the following:

- visual inspections of the system, components, pipe work controls and accessories
- electrical tests, including isolation, testing of insulation resistance of equipment, resistance of the internal circuits of equipment, polarity of supply and equipment, continuity of earthing, and correct electrical connections and load current
- refrigeration tests, including pressure

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	testing, leak testing, evacuation testing, controls tests, refrigerant charge, and operating pressures and temperatures

Unit Mapping Information

This unit replaces and is equivalent to UEENEEJ109A Verify functionality and compliance of refrigeration and air conditioning installations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0094 Verify functionality and compliance of refrigeration and air conditioning installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - using risk control measures
  - using personal protective equipment (PPE)
- acting within regulatory limits, implementing legislation, industry standards, codes of practice and regulations
- applying sustainable energy principles and practices
- completing reporting in accordance with workplace procedures
- conducting all refrigeration tests safely and correctly, including:
  - pressure testing, leak testing, evacuation testing, controls tests, refrigerant charge, operating pressures and system operation
- conducting electrical tests safely and correctly, including:
  - isolation, testing of insulation resistance of equipment, resistance of the internal circuits of equipment, polarity of supply and equipment, continuity of earthing, and correct electrical connections and load current
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- identifying non-compliant defects from test results
- identifying visual defects
- planning refrigeration and air conditioning installation compliance inspections and testing
- reading and interpreting drawings and requirements related to the installation
- recommending appropriate corrective actions
- selecting, obtaining and checking relevant equipment, materials, tools and testing devices required to carry out the work
- using manufacturer specifications and manuals.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- refrigeration and air conditioning installation functionality tests and verification methods
- refrigeration and air conditioning installation tests and verification methods, including visual inspections, mandatory tests and verification requirements
- refrigeration testing requirements and procedures, including:
  - controls
  - leak test
  - operating pressures and temperatures
  - pressure test
  - refrigerant charge
- vacuum electrical testing requirements and procedures, including:
  - isolation and tagging off
  - continuity of earthing: correct electrical connections
  - isolation testing: insulation resistance of equipment
  - load current
  - polarity of supply and equipment
  - resistance of the internal circuits of equipment
  - insulation resistance of the equipment
- relevant environmental and sustainable principles and practices, including:
  - environment protection
  - sustainable energy
  - sustainable resources
- relevant equipment, materials, tools and testing devices, including:
  - air pressure and flow measurement and testing devices
  - electrical measuring and testing devices, including multimeters, megohm meters (insulation resistance tester) and ammeters
  - pressure testing and leak testing equipment and tools, including oxygen-free dry nitrogen cylinder and regulator
  - refrigerant pressure and temperature measuring and testing devices
  - refrigerant PPE
  - refrigeration and electrical hand and power tools
  - vacuum pump and electronic vacuum measuring device
- relevant industry standards, codes of practice and regulations
- relevant installation specifications and drawings
- relevant job safety assessments or risk mitigation processes, including electrical safe working practices
- relevant refrigeration and air conditioning manufacturer specifications and instructions

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- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- verifying compliance and functionality of refrigeration and air conditioning installations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.
- As well as meeting these Assessment Conditions, to achieve competency in this unit, the assessment must include an assessment of the Performance Evidence and Knowledge Evidence under the direct supervision of the Registered Training Organisation's Assessor who meets the requirements specified above.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0095 Recover refrigerant from stationary self-contained end of life decommissioned equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to recover refrigerant from stationary self-contained end of life decommissioned equipment. It applies to those engaged in the scrapping, recycling and/or disposal of stationary self-contained refrigeration and air conditioning equipment.

It includes working safely and recovering non-flammable and flammable refrigerants from stationary self-contained end of life decommissioned refrigeration and air conditioning equipment into designated cylinders for disposal using relevant tools and equipment. It also includes applying the legal requirements to handle refrigeration and air conditioning equipment and to handle, store and dispose of refrigerants. It does not include the recovery of ammonia or carbon dioxide (CO^2) refrigerants.

Refrigerants to be recovered may be flammable, non-flammable or a mixture of both and difficult to accurately identify. To prevent the possibility of ignition, the equipment and procedures used to recover the refrigerant should be those required for flammable refrigerants when the refrigerant has been identified as flammable or it is unknown.

To undertake this unit, the learner must have a Trainee Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted.

The skills and knowledge described in this unit require a national Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting the refrigerant or manufacturing, installing, commissioning, servicing, maintaining or decommissioning refrigeration and air conditioning equipment.

The skills and knowledge described in this unit may, in some jurisdictions, also require a licence or permit to practice in the workplace subject to regulations for undertaking refrigeration and air conditioning work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Prepare to recover refrigerant	**1.1** WHS/OHS procedures for refrigerant recovery are identified and applied in accordance with workplace procedures and regulatory requirements
	1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work
	1.3 Refrigeration/air conditioning systems are inspected, including refrigerant access points and refrigerant type, and the nature of work to be undertaken is confirmed in accordance with scope of work and manufacturer specifications
	1.4 Materials, tools, equipment, testing devices, signage and personal protective equipment (PPE) required to recover the refrigerant are identified, obtained and checked for correct operation in accordance with the refrigerant type and flammability
2. Recover refrigerant from decommissioned stationary refrigeration/air conditioning equipment	**2.1** Recovery equipment is connected to the system through service gauge lines using tools and fittings to prevent/minimise refrigerant loss in accordance with workplace procedures, manufacturer instructions and regulatory requirements
	2.2 Recovery cylinder weight and pressure is measured and recorded to ensure refrigerant recovered is accepted in accordance with workplace procedures and regulatory requirements

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	2.3 Refrigerant is recovered from system by operating and monitoring the recovery equipment in accordance with manufacturer instructions
	2.4 Recovery equipment, including service gauge lines and recovery cylinder, are shut down and disconnected when the refrigerant is recovered in accordance with manufacturer instructions
	2.5 Recovery cylinder weight is measured and the quantity of the refrigerant recovered is recorded in accordance with regulatory requirements
3. Complete work and relevant documentation	**3.1** Worksite, tools and equipment are cleaned, checked and made safe in accordance with workplace procedures and manufacturer instructions
	3.2 Tools, equipment and recovery cylinder refrigerant are securely stored in accordance with regulatory requirements and workplace procedures
	3.3 WHS/OHS issues are reported to relevant person/s in accordance with workplace procedures
	3.4 Documentation is completed and provided to relevant person/s in accordance with workplace procedures and regulatory requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Work environments must include the following:	• scrapping, recycling and/or disposal of decommissioned stationary self-contained refrigeration and air conditioning equipment

Recovery equipment and procedures must:	• be the same as for a flammable refrigerant if:
	  • refrigerant is unknown; or,
	  • there is a suspicion that it is flammable

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Standards must include the following:	• refrigerant handling codes of practice • AS/NZS ISO 817 Refrigerants – Designation and safety classification • AS/NZS 5149.4 Refrigerating systems and heat pumps - Safety and environmental requirements - Operation, maintenance, repair and recovery
Legislation must include the following:	• Ozone Protection and Synthetic Greenhouse Gas Legislation Amendment Act (or Bill) and regulations • federal/state/territory WHS/OHS legislation • federal/state/territory transport of dangerous goods legislation
Documentation, including reporting formats, must include the following:	• Australian Refrigeration Council's (ARC) reporting requirements • equipment manufacturer's specifications and instructions • Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) Refrigerant Guide • AIRAH's Flammable Refrigerants Safety Guide and Fact Sheets
Equipment and tools must include a minimum of the following:	• one decommissioned stationary refrigeration unit and one decommissioned stationary air conditioning unit: • one unit must contain non-flammable refrigerant and one unit must contain flammable refrigerant • refrigeration hand tools • recovery units and cylinders suitable for the non-flammable refrigerants • recovery units and cylinders suitable for the flammable refrigerants • soap/water 'bubbles' leak detection fluid
Measuring and test equipment must include the following:	• refrigerant pressure/temperature chart • scales for weighing recovery cylinder • digital thermometers • manifold gauges suitable for the refrigerant types
Safety systems and PPE must include the following:	• PPE suitable for handling refrigerants, including safety glasses, gloves and safety shoes • safety data sheets (SDS) for refrigerants • safe work method statements (SWMS)
Software/systems must include the following:	• refrigeration/air conditioning manufacturer websites to access equipment specifications

Unit Mapping Information

No equivalent unit

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0095 Recover refrigerant from stationary self-contained end of life decommissioned equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying environment protection and sustainable energy and resources principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - correct use of personal protective equipment (PPE)
  - applying risk control measures
- cleaning,checking and making safe the worksite, tools and equipment
- completing relevant documentation and reporting to relevant person/s
- complying with relevant legislative, regulatory/licensing, standards and code requirements, manufacturer recommendations/instructions and industry practices
- fitting access valves to the system and connecting service gauges
- identifying the refrigeration/air conditioning unit’s refrigerant access points and the refrigerant type from the equipment nameplate or manufacturer specifications
- identifying, obtaining and checking relevant equipment, tools and materials required to work with non-flammable and flammable refrigerants, including:
  - recovering unit and recovery cylinder
  - servicing gauges
  - using refrigeration hand tools
- measuring and recording the quantity of the refrigerant recovered
- measuring and recording the recovery cylinder’s weight to ensure it can accept the refrigerant to be recovered
- recovering flammable and non-flammable refrigerant from refrigeration or air conditioning systems using appropriate equipment and tools
- storing tools, equipment and recovery cylinder securely.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- leak detectors and ’bubbles‘ leak detection procedure
- recovery cylinders, including:
  - care and maintenance
  - identifying service access valves
  - leak testing with ’bubbles’
  - ratings for various applications, including non-flammable and flammable refrigerants
  - relevant documentation and records
  - safe handling, storage and transportation
  - tare and refrigerant weight
  - types, markings and labelling
- refrigerants, including:
  - current refrigerants used, including R12, R134a, R22, R407C, R410a, hydrocarbons and flammable synthetics (R32)
  - environmental issues
  - identifying the refrigerants from system’s nameplate and manufacturer specifications
  - indicators that the unit may contain flammable refrigerant
- refrigerant oils, including:
  - absorption of refrigerant
  - types
- recovery units, including:
  - basic operation of unit
  - care and maintenance
  - identifying service access valves
  - non-flammable and flammable refrigerant recovery procedures
  - non-flammable and flammable refrigerant types
  - safety precautions
- service gauges, including:
  - manifold gauges:
    - basic types and use for recovering refrigerant
    - care and maintenance
    - hose shut-off valves and adaptors
  - system access fittings:
    - fitting bullet valves and piercing pliers
    - hazards and related safe working practices
    - types

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    - typical locations, connection and operation
  - using service gauges:
    - pressure readings
    - service gauge manifold hose fitting
    - service gauge manifold hose removal
- working safely with refrigerants and refrigerant oils, including:
  - relevant PPE and safety signage
  - relevant workplace and WHS/OHS procedures, including risk assessment and control measures
  - safe handling procedures
  - flammable and non-flammable refrigerant handling reporting requirements
  - relevant legislation, standards and codes
  - safety data sheets (SDS).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0096 Inspect, test and repair fire and smoke control features of mechanical services systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to inspect, test and repair all safety measures relating to fire and smoke control features of mechanical services systems.

Mechanical services refers to equipment required to operate or switch off as an active part of a buildings fire and smoke hazard management system not limited to the following: vents and dampers including fire, smoke and air dampers, smoke and heat vents, motorised relief openings, windows and shutters, and outdoor intakes; fire and smoke curtains; exhaust systems, including kitchen exhaust systems; fire fan control panel and fire indicator panel; fire isolated exit pressurisation systems; smoke exhaust systems; system shutdown; and smoke reservoirs.

It includes relevant Australian Standards and Building Code responsibilities and statutory requirements of building owners, contractors and service technicians related to fire and smoke control features of mechanical services systems.

This unit is suitable for trade and post trade training in the refrigeration and air conditioning sectors.

Although this unit does not include designing systems, it includes understanding the different types of systems and their installation, relevant parts of the associated Australian Standards, the Building Code of Australia and Building Regulations. Refer to the UEE Electrotechnology Companion Volume Implementation Guide for a list of Standards relevant to this unit.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional licences, permits and/or other conditions may apply in some jurisdictions subject to regulations related to fire and smoke control features of mechanical services systems work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

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Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERA0051 Install, commission, service and maintain air conditioning systems

Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct safety checks and routine service activities	**1.1** WHS/OHS risk control measures and procedures for carrying out the work are obtained and implemented in accordance with workplace procedures
	1.2 Relevant legislation, codes and standards are identified and obtained
	1.3 Facility specific approved design, drawings, baseline data and other relevant information as required are identified and obtained
	1.4 Routine service or inspection cycle or schedule and responsibilities are determined in compliance with statutory requirements and standards
	1.5 Log-sheet of safety and/or operational checks, inspections, tests and routine service action requirements are obtained or created
	1.6 Details of any reported defects are obtained
	1.7 Required tools, instruments, equipment and resources are determined
2 Perform safety measures inspections and tests	**2.1** Inspection and test tools, instruments or equipment are obtained

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	2.2	Tools, instruments and equipment for correct operation and calibration if required are checked
	2.3	Safety measures inspections and tests on individual components or sections and systems are performed
	2.4	Inspections and tests in compliance with legislation, codes, standards and OHS/WHS requirements and responsibilities are carried out
3 Carry out safety measures routine service	**3.1**	Routine service work in compliance with legislation, codes, standards and OHS/WHS requirements and responsibilities are carried out
	3.2	Equipment, machines and plant are isolated and checked where necessary in strict accordance with WHS/OHS requirements
	3.3	Routine service tasks are carried out according to regulatory requirements without compromising the integrity of the building or environmental requirements
	3.4	Routine service personnel required to perform the tasks are coordinated in an efficient and effective manner
	3.5	Responsibility boundaries with other routine service participants are observed
	3.6	Unexpected situations are addressed by reference to job specifications, building management procedures and discussion with appropriate personnel
	3.7	Defects and faults are identified and reported, and rectification recommended
	3.8	Plant, systems and equipment are checked for correct operation on completion of routine service tasks
4 Develop and maintain records	**4.1**	Notes and/or complete checklists of the inspections, tests and routine service carried out are prepared in accordance with regulatory requirements and timeframes
	4.2	Notes, checklists and updated log sheets are collated and readily accessible on site
	4.3	Safety checks, routine service and yearly condition report are signed off and reports submitted to building manager and/or owner

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Demonstration of this unit of competency must include:

- planning, implementing and applying a building's routine service program of fire and smoke control features of mechanical services systems on more than one occasion and in two different facilities

Unit Mapping Information

Newly created unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0096 Inspect, test and repair fire and smoke control features of mechanical services systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- implementing WHS/OHS workplace procedures and practices including the use of risk control measures
- reading and interpreting a cause-and-effect chart
- testing air handling changeover under fire/smoke conditions
- testing fire isolated stairwells and escape routes protected by air-pressurisation systems
- testing of mechanical services required to shut down under fire/smoke conditions
- using test instruments
- carrying out performance testing
- reporting defects, faults and recommend timeframes and solutions
- signing off and submitting documentation
- carrying out scheduled routine service at required intervals.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- types of safety measures and typical defects and faults
- types of buildings and Safety Measures requirements based on occupancy permit
- Building regulations and legislation
- Building Code of Australia relevant to smoke hazard management systems
- relevant Australian Standards (Refer UEE Companion Volume Implementation Guide)
- statutory requirements and responsibilities in relation to safety measures
- routine service participants and responsibilities
- routine service, inspection and testing standards and requirements at various intervals
- documentation types and their purpose
- fire and smoke control features of mechanical services requirements, methods, applications, systems and equipment

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- inspection and test tools, instruments and equipment types, applications, operation, use and care
- individual components or sections and systems safety measure inspection and test methods
- how to read and interpret a cause-and-effect chart.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including: regulations, codes of practice, industry standards, workplace procedures, equipment specifications, relevant facility specific designs, drawings, baseline data or records and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERA0097 Install, commission, service and maintain variable refrigerant flow air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to safely and effectively install, commission, service and maintain variable refrigerant flow (VRF) air conditioning systems.

It includes sourcing relevant data and schematics; installing components, pipe work, accessories and controls; commissioning the system to ensure it operates at the specified design conditions; locating and rectifying faults; and, carrying out maintenance tasks.

VRF systems are commonly found in commercial applications. They contain one or more outdoor units with multiple indoor units. Each indoor unit typically has its own metering device and shares a common pipework system. They are either heat pump or heat recovery systems. Heat pump systems will only allow indoor units to operate in the same mode (either heating or cooling). A heat recovery system will allow each indoor unit to operate in a different mode (either heating or cooling) from the same system by the use of a branch box.

The skills and knowledge in this unit of competency will be applied by refrigeration and air conditioning technicians during the installation, commissioning and servicing of VRF air conditioning systems.

The skills and knowledge described in this unit require a current national Trainee or Full Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting, manufacturing, installing, commissioning, servicing, maintaining or decommissioning activities are being carried out.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, skills and knowledge described in this unit require a relevant contract of training, such as an Australian Apprenticeship.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to refrigeration, air conditioning and electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERA0051 Install, commission, service and maintain air conditioning systems

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Competency Field

Refrigeration and air-conditioning

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on variable refrigerant flow (VRF) air conditioning systems	**1.1** WHS/OHS risk control measures and procedures for carrying out the work are obtained and implemented in accordance with workplace procedures and regulatory requirements
	1.2 Work details are determined from documentation and/or supervisor to establish scope of work to be completed in accordance with workplace procedures
	1.3 Relevant manufacturer specifications and worksite plans are interpreted and incorporated in work planning
	1.4 Components, piping, accessories, controls and consumables for the work are obtained and checked against job requirements in accordance with Australian Standards and codes of practice
	1.5 Tools, equipment and testing devices to complete work are obtained and checked for operational safety in accordance with workplace procedures
2 Install VRF air conditioning systems	**2.1** The location and orientation of branching and support of pipe work is determined and laid out in accordance with system design
	2.2 Major components are securely mounted in the locations identified by the documentation or the supervisor in accordance with workplace procedures and regulatory requirements
	2.3 Refrigerant pipework and associated components are

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		installed and tube cleanliness is maintained at all times in accordance with workplace procedures, Australian Standards and manufacturer specifications
	2.4	Condensate pipework is installed and tested in accordance with design, Australian Standards and manufacturer specifications
	2.5	Communication wiring is checked to ensure it conforms to manufacturer circuit diagram, specifications and Australian Standards
	2.6	Pressure testing of the installed components and pipe work is conducted to the required level for the type of refrigerant being used in accordance with relevant Australian Standards, codes of practices and workplace procedures
	2.7	Leaks are located and rectified employing appropriate methods in accordance with relevant Australian Standards, codes of practices and workplace procedures
	2.8	Air conditioning system is evacuated to remove moisture and other contaminants in accordance with relevant Australian Standards, codes of practices and workplace procedures
	2.9	Vacuum drop test is carried out to verify all moisture and other contaminants have been removed from the system in accordance with relevant Australian Standards, codes of practices and workplace procedures
3 Commission VRF air conditioning systems	**3.1**	Extra refrigerant charge quantity is documented in accordance with Australian Standards and manufacturer specifications
	3.2	Measurements are obtained using manufacturer diagnostic tools and recorded to confirm system operation is in accordance with the system’s design and manufacturer specifications
	3.3	Measurements are obtained and recorded to confirm that operating voltage and current are within manufacturer specifications
4 Locate and rectify faults on VRF air conditioning systems	**4.1**	Fault diagnosis processes are carried out in accordance with manufacturer processes and specifications, relevant Australian Standards, codes of practices and workplace procedures

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	4.2	Required repairs are identified and reported in accordance with manufacturer processes, relevant Australian Standards, codes of practices and workplace procedures
	4.3	Routine maintenance requirements are identified in accordance with relevant Australian Standards and workplace procedures
5 Complete work and report activities	**5.1**	WHS/OHS risk control measures continue to be applied in accordance with workplace procedures and regulatory requirements
	5.2	Worksite and equipment are cleaned and made safe in accordance with workplace procedures
	5.3	Required documentation is completed in accordance with relevant regulations, Australian Standards and codes of practice
	5.4	Supervisor is notified of task completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

Newly created unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERA0097 Install, commission, service and maintain variable refrigerant flow air conditioning systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- installing and commissioning multi head variable refrigerant flow (VRF) air conditioning systems in accordance with manufacturer specifications
- using manufacturer diagnostic tool to assist in finding two of the following faults on a variable refrigerant flow air conditioning system (Note: one fault to be applied to the VRF system on each occasion):
  - contaminants in the system
  - incorrect refrigerant charge
  - faulty pressure and temperature sensors
  - communication errors
  - faulty fan motors
  - faulty refrigerant metering device (RMD)
  - insufficient airflow
- completing required documentation and record keeping
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying relevant manufacturer specifications, Australian Standards, regulation and codes of practice.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- VRF air conditioning systems including:
  - different types, their components and application
  - operating principles (cooling, heat pump and heat recovery)
  - control principles

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    - operation in the heating and cooling cycles
    - accessing manufacturer specifications and instructions
- VRF pipework including:
    - refrigerant pipe layout and installation requirements including:
        - pipe diameter, length and wall thickness
        - pipe branch orientation and connections
        - expansion and contraction of pipework
        - piping support
    - condensate and traps
    - technique for condensate flow testing
- VRF wiring including:
    - separation of power and communications cabling
    - communication wiring requirements and component addressing
- requirements for branch box installation location
- requirements for installation of multiple outdoor VRF units
- working with refrigerants in VRF systems including:
    - checking and adding charge of refrigerant
    - procedure to check system valves are open during pressure test and evacuation
    - refrigerant leakage concentration levels permitted in enclosed spaces
- symptoms of typical faults and repair techniques including:
    - contaminants in the system
    - incorrect refrigerant charge
    - faulty pressure and temperature sensors
    - communication errors
    - faulty electronically commutated (EC) motors
    - faulty refrigerant metering device (RMD)
    - insufficient airflow
- maintenance requirements specific to VRF systems
- commissioning requirements specific to VRF systems
- manufacturer programs and tools including:
    - built-in self-commission test
    - plug-in diagnostic tools.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, Australian Standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0001 Apply environmentally and sustainable procedures in the energy sector

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply environmentally sustainable procedures in the energy sector.

It includes identifying and applying sustainable methods of work practice that minimise energy and material usage and to apply energy reduction strategies in the energy sector workplace.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify sustainable work practice	**1.1** Activities are planned, prepared and sequenced to ensure work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are followed in accordance with work requirements
	1.2 Relevant personnel are consulted to ensure work is

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		coordinated effectively with others
	1.3	Materials required for the work are obtained and checked in accordance with workplace procedures and compliance with work requirements
	1.4	Location that activities are to be undertaken is determined from job requirements
	1.5	Workplace environmental risks and resource efficiency issues are identified
2 Apply sustainable work practice	**2.1**	WHS/OHS policies and workplace procedures for undertaking administrative functions are followed
	2.2	Energy assessment is undertaken in accordance with requirements to implement techniques which produce energy reduction directly or indirectly
	2.3	Approval is obtained for suggested improvements to energy efficient methods and components from relevant person/s before any contingencies are implemented
	2.4	Unplanned events or conditions are responded to in accordance with workplace procedures in a manner that minimises risk to personnel, equipment and environment
	2.5	On-going checks of the quality of the work are undertaken in accordance with established procedures
	2.6	Work is carried out efficiently without unnecessary waste of materials or damage to the surrounding environment while using sustainable work practices which minimise wastage of energy and materials either directly or indirectly
3 Complete workplace documentation	**3.1**	Documentation/reports are completed to ensure detailed promotional activities requirements are met
	3.2	Suggestions are made to relevant person/s for improvement/s to workplace practices to minimise energy and materials wastage
	3.3	Workplace documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK142A Apply environmentally and sustainable procedures in the energy sector.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0001 Apply environmentally and sustainable procedures in the energy sector

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) and environmental requirements
- applying sustainable energy principles and work practice in daily work activities
- completing relevant workplace documentation
- coordinating work with others
- identifying and obtaining materials required for work
- identifying environmental risks and resource efficiency issues
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel, equipment and environment
- demonstrating the application of environmental and sustainable procedures in the energy sector, including:
    - undertaking an energy assessment
    - selecting energy efficient methods and components
    - reviewing environmentally and sustainable procedures and documenting suggestions for improvements to relevant person/s
    - obtaining approval from appropriate personnel before any contingencies are implemented.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- sustainable work practices, including:
    - economic benefits of sustainable initiatives
    - effects of neglecting sustainable work practice
    - international and national greenhouse imperatives
    - legislative requirements

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  - notion of sustainable work practice
  - the greenhouse effect - causes and consequences
  - the role of regulators and similar bodies
- techniques for reducing carbon produced energy and hence greenhouse gases, including:
  - domestic, commercial and industrial strategies
  - energy efficient retrofits (overview)
  - renewable energy (RE) technologies (overview)
- trade-related technologies and methods
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and technology currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0002 Assemble and connect remote area power supplies

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble and connect remote area power supply (RAPS) systems where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing to install RAPS, installing RAPS and completing maintenance work on battery banks and reporting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install RAPS	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for relevant work area are identified and applied in accordance with workplace procedures
	1.2 Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Installation of apparatus is prepared in consultation with relevant person/s and sequenced accordingly
	1.5 Nature and location of the work is determined from documentation or relevant person/s to determine the scope of work
	1.6 Location/s of apparatus and associated equipment is planned within constraints of the building structure and regulations
	1.7 Advice on coordinating work with others is obtained from relevant person/s and applied
	1.8 Material needed for installation work is obtained in accordance with workplace procedures and checked against job requirements
	1.9 Tools, equipment and testing devices required for the installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.10 Preparatory work is checked to ensure no damage has occurred and it complies with requirements

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2 Install RAPS	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Apparatus and associated equipment are installed in compliance with industry technical standards, job specifications and requirements, and with sufficient access to not impact terminations, adjustments and maintenance
	2.5	Wiring is terminated at apparatus and associated equipment in accordance with manufacturer specifications, functional and regulatory requirements
	2.6	Methods for dealing with unexpected events are discussed with appropriate person/s and documented in accordance with workplace procedures
	2.7	Unexpected events are dealt with safely and with approval of authorised person/s
	2.8	Quality checks of installed apparatus are conducted in accordance with workplace procedures
	2.9	Apparatus installation is conducted minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete work on RAPS	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Final checks that the installed apparatus conforms to requirements are conducted
	3.4	‘As-installed’ apparatus and associated equipment are documented and appropriate person/s notified in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Assembling and connecting RAPS must include at least the following:	• two different systems, including:
	  • a generator set
	  • a photovoltaic (PV) array
	  • at least one similar RAPS system where the battery bank is charged form a wind generator

Exposed voltage is not greater than:	• 50 V a.c., or • 120 V d.c

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK111A Assemble and connect remote area power supplies.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0002 Assemble and connect remote area power supplies

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- assembling and connecting remote area power supply (RAPS) systems
- accurately placing and securing apparatus
- checking isolation of circuits/machines/systems
- completing relevant reporting
- complying with manufacturer specifications, functional and regulatory requirements
- conducting quality checks
- connecting apparatus and associated equipment
- coordinating work with relevant person/s
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining scope of work from documentation and/or relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- reading and interpreting drawings related to apparatus, locations and circuit connections
- maintaining fire integrity.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- RAPS extra-low voltage (ELV) installations, including:
  - documentation, including:
    - records of periodic inspection and testing
    - test results that comply with requirements
    - test results reporting required by authorities
  - methods for providing compliant protection
  - requirements for:
    - installation of wiring and equipment
    - installation planning and selection of equipment
    - testing and verification
- sustainable energy principles.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to assembling and connecting RAPS
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0003 Assess energy loads and uses for energy efficiency in commercial facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to undertake energy audits to assess energy loads of commercial facilities, evaluate the energy efficiency of the facilities and to make recommendations on design implementations.

It includes working safely, applying extensive knowledge of commercial electrical installations and components and their operating parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting engineering solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assess commercial facility for energy efficiency	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures for relevant work area are identified,

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	evaluation		obtained and applied
		1.2	Hazards are assessed, risks are assessed and control measures implemented
		1.3	Extent of the energy assessment is determined from analysis of facilities, orientation and floor plans, building structure plans, energy accounts and situation reports in consultation with relevant person/s and in accordance with workplace procedures
		1.4	Energy assessment activities/audits are planned to meet scheduled timelines in consultation with others involved in the work
		1.5	Strategies are determined to ensure energy efficient solutions are developed and implementation is carried out in accordance with workplace procedures
2	**Assess commercial facility for energy efficiency evaluation**	**2.1**	WHS/OHS risk control work measures and procedures are followed
		2.2	Energy loads are considered when developing energy efficient strategies to address and minimise energy use
		2.3	Parameters, specifications and performance requirements in relation to energy use are set in accordance with workplace procedures
		2.4	Approaches/strategies to resolving and minimising energy use are analysed to provide the most effective solutions in accordance with workplace procedures
		2.5	Unplanned events are dealt with safely, efficiently and consistently in accordance with regulatory requirements and workplace procedures
		2.6	Quality and energy efficiency of the audit are monitored against personal performance agreement and/or workplace procedures and industry standards
3	**Document assessment of commercial facility for energy efficiency**	**3.1**	Proposed solutions/strategies to minimise energy use are tested to determine their effectiveness and modified, as required, in accordance with workplace procedures
		3.2	Adopted solutions are documented in accordance with workplace procedures, including instructions for implementation that incorporate the risk control

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measures to be followed

3.3 Authorised person/s required to implement solutions for energy use is coordinated in accordance with regulatory requirements and workplace procedures

3.4 Justification for strategies used to minimise energy use is documented for inclusion in work/project development records in accordance with professional standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out energy assessments and documenting energy efficiency strategies must include at least the following:

- two commercial facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK154A Assess energy loads and uses for energy efficiency in commercial facilities.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0003 Assess energy loads and uses for energy efficiency in commercial facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying and quantifying the extent of the energy use, loads and patterns of usage for electrical and energy installation energy problem/s
- identifying the operational patterns in control of the user that impacts on energy use and the energy services supplied by the energy technology that allow the quantifying energy use
- performing an energy balance to model the current energy use to the existing energy bills
- identifying effective energy saving opportunities to reduce energy use
- understanding the extent of the scope of the electrical and energy installation design problems, constraints and likely cost of installation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each problem
- testing and commissioning energy saving opportunity solutions to energy problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting and reporting financial and technical justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to resolve/minimise energy usage
- analysing facilities orientation and floor plans, building structure plans, energy accounts and situation reports to determine extent of the energy assessment
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
    - applying safe working practices
- applying sustainable energy principles and practices
- assessing commercial facilities for energy efficiency evaluation
- calculating best practice energy and water star ratings
- calculating energy and energy balance, including power calculations, usage time calculations, power factor calculations and energy conversions from kilowatt hour (kWh) to megajoules (MJ)
- calculating energy and power

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- calculating energy balance for commercial facilities
- calculating greenhouse gas emissions, emissions factors, carbon intensity of electricity vs. natural gas and liquified petroleum gas (LPG) and global warming potential and carbon dioxide (CO2) equivalents
- carrying out energy assessments to address energy efficiency issues in commercial facilities, including:
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- communicating effectively with relevant stakeholders
- conducting thermal performance assessment of a commercial facility
- considering energy loads when determining strategies
- determining strategies to ensure energy efficient solutions are developed and implemented
- developing a power and energy monitoring strategy for a commercial facility
- operating of commercial pools in terms of pool pumps, pool backwashing, cartridge filters, pool turnovers, pool water use and pool heating
- operating an air conditioning system and each component, including the compressor, evaporator, condenser, expansion valve and fan coil
- planning assessment activities/audits to meet scheduled timelines
- performing solar photovoltaic (PV) energy calculations and calculating renewable energy certificate (REC) entitlement for a small solar PV system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- commercial facilities energy efficiency assessment, including:
  - energy management, legislation and regulation relevant to residential, office and retail premises encompassing:
    - national Building Code of Australia (BCA)
    - state/territory building codes
    - Standards Australia for energy auditing
    - state/territory-based legislation for energy management in business
    - National Australian Built Environment Rating System (NABERS) tenancy
    - NABERS office
    - building energy efficiency certificates
    - minimum renewable energy (RE)
    - RE credits
    - small technology credits
  - water supply and use encompassing:
    - collection and analysis of information for commercial facilities water use and methods to improve water efficiency in the home

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  - ability to analyse the water consumption index for different commercial sectors
  - ability to analyse commercial facilities water use and ways to minimise the use of water
  - understanding of the methodology applied to water savings
  - calculate water star rating
- environmental context – greenhouse gas emission, ecological impacts and resource use encompassing:
  - concept of greenhouse gas emissions and global warming
  - fossil fuel resource depletion and how mining impacts the environment
  - breakdown of energy consumption in the Australian commercial sector
  - breakdown of water consumption in the Australian commercial sector
- energy efficiency methodologies encompassing:
  - energy services approach and relationship to energy auditing
  - end-user focus and relationship to energy auditing
  - opportunistic approach and relationship to energy auditing
  - energy management strategy in relationship to energy efficiency, energy management, demand management, fuel switching and RE
  - financially viable best practice solutions; including net present value and internal rate of return
  - water management strategy in relationship to water efficiency, water management, source switching and water reuse/recycling
  - opportunistic best practice solutions in relationship to water and the differences to the financially viable best practice solutions
  - benchmarking with reference to statistical benchmarks, technology benchmarks and best practice financially viable benchmark methodologies
  - calculating best practice energy and water star ratings
  - property cost and environmental impact tables in relationship to reporting energy audit outcomes
  - sustainable initiative investment tables in relationship to reporting energy audit outcomes
- energy and society encompassing:
  - understanding of electricity charges
  - drivers of the predicted electricity price increases in Australia
  - network charge and retail charge increases and how they relate to electricity price
  - the carbon tax or similar and impact on electricity prices
  - RE target and impact on electricity prices
  - impact of electricity prices to commercial facilities
- energy auditing and practice encompassing:
  - scope of Australian Standards for energy auditing
  - energy audit process in relationship to data collection, analysis and the communication of results

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- accounts, bills and data, tariff structures and the identification of commercial tariff types
- calculate energy and energy balance including power calculations, usage time calculations, power factor calculations and energy conversions from kWh to MJ
- process involved in onsite assessment in a commercial facilities energy audit
- gathering information on commercial facilities energy use and costs
- risks and hazards associated with a commercial facilities energy audit
- calculate energy and power
- power rating of equipment and metering and measurement in a commercial facilities energy audit
- calculate energy balance for commercial facilities
- advice on ways to improve energy efficiency
- calculating greenhouse gas emissions, emissions factors, carbon intensity of electricity vs. natural gas and LPG and global warming potential and CO2 equivalents
- financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
- reporting and communication of energy audit results

- energy management encompassing:
  - energy management strategies
  - practice-based energy management
  - technology-based energy management
  - interaction between human resources and practice-based control
  - application of technology-based energy management
  - identify potential energy savings from application of energy management
- power and energy data recording encompassing:
  - identify the structure and purpose of power and energy data recording for whole systems and equipment
  - review or develop single line schematic of electrical system of a commercial facility
  - establish the power and energy data gap from the energy audit to achieve Australian Standard compliant energy audits
  - identify electrical loads that need contribute more than 5% of energy use
  - understand and explain the operation seven different power and energy monitoring equipment available
  - understand the implications of data recording intervals for monitoring equipment
  - develop a power and energy monitoring strategy for a commercial facility
  - deploy commercial facility power and energy monitoring strategy
  - draw conclusions and report on power and energy data collection in a commercial facility
- water auditing services and design encompassing:
  - water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top-up water use for cooling towers and pool systems

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- commercial facility water meter reading
- trends of water use and charges for commercial facilities
- water efficiency labelling scheme (WELS) as it relates to water auditing
- identification of water efficiency opportunities in commercial facility assessments
- operation of a rainwater and grey water systems
- factors that impact on landscape water demand

- lighting services and efficient design encompassing:
  - fundamental illumination design for commercial facilities
  - illumination terms: light output, light level and brightness
  - determining target light levels for differing tasks
  - characteristics of light sources including efficacy, colour temperature and colour rendering index
  - ballast types, their efficiency and benefits
  - incandescent lamps, light-emitting diode (LED), induction lamps, halogen lighting, commercial fluorescent lighting, metal halide, mercury vapour and comparisons between these and applications for the commercial facilities
  - application of lighting methodology for best practice energy efficiency design
  - energy saving lighting opportunities in the commercial facilities
- thermal performance and climate control encompassing:
  - thermal performance of a building impacts on heating, ventilation and air conditioning energy use, including orientation, thermal mass, insulation, glazing, shading and ventilation
  - air conditioning designs, including central, ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners, and through wall/window and portable units
  - improvement to air movement systems in commercial facilities, including diffusers
  - improvement to ventilation systems in commercial facilities
  - improvement of thermal performance of a commercial building envelope
  - ability to apply the knowledge of Australian climate zones
  - air conditioning technologies, including refrigerated type air conditioning, inverter type air conditioning, reverse cycle air conditioning, evaporative air conditioners, breeze power systems and digital scroll compressors
  - application of energy efficiency ratio (EER) and coefficient of performance (COP) and show proficiency in EER and COP calculations
  - application of the air conditioning star ratings to commercial facilities
  - gas and electric heating options and air (ducted) heating
  - operation of an air conditioning system and each component, including the compressor, evaporator, condenser, expansion valve and fan coil
  - ceiling and pedestal fans and ventilation climate control
  - factors that impact on climate control energy consumption
  - best practice climate control methodology as applied to the commercial facilities

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  - commercial facilities climate control saving opportunities
  - conducting thermal performance assessment of a commercial facilities
- food storage services and efficient design encompassing:
  - refrigeration system basics operation
  - different refrigeration models
  - refrigeration characteristics, including operation, automatic defrost, cooling temperature control, ice maker, ice and water dispenser, door seals and hinges
  - factors that impact on refrigerator energy use, including size, configuration temperature setting, clearance around cabinet and ambient conditions, making ice, ice and water anti-sweat heaters, seals, insulation, compressor efficiency and age
  - refrigerator and freezer star ratings
  - cold room and freezer room energy saving opportunities
  - food storage saving opportunities
- food preparation services and efficient design encompassing:
  - different food preparation appliances
  - different operation of gas and electric hot plates and ovens and the advantages and disadvantages of each
  - EMI food preparation methodology
  - food preparation saving opportunities
  - food preparation services and efficient design
- water heating services and efficient design encompassing:
  - different water heaters, including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
  - solar water heater configurations and characteristics including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster
  - renewable energy certificates (RECs) and standard test conditions (STCs) and how these relate to solar water heater STCs
  - factors that influence water heater energy use, including pipe work and fitting insulation, atmospheric conditions, water efficiency, temperature setting, and maintenance and operation
  - water heating/cooling calculations
  - EMI water heating methodology
  - commercial water heating saving opportunities
  - types of entertainment and administration appliances found in commercial residences
- entertainment and administration services and efficient design encompassing:
  - appliance standby power, including the different mode, passive and active standby
  - appliance energy star ratings
  - minimum energy performance standard (MEPS) and labelling requirements for televisions
  - network standby management strategies

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  - computer energy consumption, including computer power management
  - entertainment and administration saving opportunities
- cleaning services and efficient design encompassing:
  - clothes washer types, including vertical axis and horizontal axis
  - factors that impact on clothes washing energy use
  - energy and water MEPS star ratings and how they apply to clothes washers
  - clothes dryer types, including spin dryer, condenser dryers, gas dryers and heat pump dryers
  - clothes dryer controls
  - dishwasher types
  - vacuum cleaner types
  - EMI cleaning methodology
  - commercial cleaning saving opportunities
- pumping systems (and pools) and efficient design encompassing:
  - pumping services in relation to commercial sector
  - pumping types including centrifugal and positive displacement and pump selection and design
  - pumping theory, including pressure head, pressure pumping vs. transfer pumping, pump curves, pump best efficiency (operating) point (BEP), variable speed drive, energy balance for a typical pumping system and electric motors
  - operating of commercial pools in terms of pool pumps, pool backwashing, cartridge filters, pools turnovers, pool water use and pool heating
  - energy efficiency pool systems design methodology
  - energy efficiency hot water, chilled and condenser water pumping systems
  - commercial pool systems saving opportunities
- smart metering solutions encompassing:
  - benefits of the different metering available to the commercial sector
  - metering opportunities relation to commercial sector
- RE (solar PV) encompassing:
  - design of solar PV systems and different panel types, including mono-crystalline, poly-crystalline and amorphous
  - solar panel characteristics and choice of selection
  - solar power system utility approval process
  - balance of systems, rules of thumb, shading, orientation and shading of strings in an on grid solar power system
  - solar PV energy calculations and calculate REC entitlement for a small solar PV system
  - different feed-in tariff schemes and how they apply to solar PV
- energy audit system encompassing:
  - commercial facilities energy audit forms and legend
  - conducting energy and water audit for the commercial sector

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    - commercial facilities sector energy audit report
- effective communication techniques
- personal performance agreement and/or workplace/industry standards
- problem-solving techniques
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- techniques to analyse facilities orientation and floor plans, building structure plans, energy accounts and situation reports.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assess energy loads, undertake energy audits of industrial properties and enterprises, evaluate the energy efficiency of the facilities and make recommendations on design implementations.

It includes working safely, applying knowledge of industrial electrical installations and components and their operating parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting engineering solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assess industrial properties and enterprises for energy	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and

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	efficiency evaluation		applied
		1.2	Hazards are identified, risks are assessed and control measures implemented
		1.3	Extent of the energy assessment is determined from analysis of facilities orientation and floor plans, building structure plans, energy accounts and situation reports in consultation with relevant person/s and in accordance with workplace procedures
		1.4	Energy assessment activities/audits are planned to meet scheduled timelines in consultation with others involved in the work
		1.5	Strategies are determined to ensure energy efficient solutions are developed and implementation is carried out in accordance with workplace procedures
2	**Assess industrial properties and enterprises for energy efficiency evaluation**	**2.1**	WHS/OHS risk control work measures and workplace procedures are followed
		2.2	Energy loads are considered when developing energy efficient strategies to address and minimise energy use
		2.3	Parameters, specifications and performance requirements in relation to energy use are set in accordance with workplace procedures
		2.4	Approaches/strategies to resolving and minimising energy use are analysed to provide the most effective solutions in accordance with workplace procedures
		2.5	Unplanned events are dealt with safely, efficiently and consistently in accordance with regulatory requirements and workplace procedures
		2.6	Quality and energy efficiency of the audit is monitored against performance agreement and/or workplace procedures and industry standards
3	**Document assessment of industrial properties and enterprises for energy efficiency**	**3.1**	Proposed solutions/strategies to minimise energy use are tested to determine their effectiveness, and modified, as required, in accordance with workplace procedures
		3.2	Adopted solutions are documented in accordance with workplace procedures, including instructions for

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implementation that incorporate the risk control measures to be followed

3.3 Authorised person/s required to implement solutions for energy use is coordinated in accordance with regulatory requirements and workplace procedures

3.4 Justification for strategies used to minimise energy use is documented for inclusion in work/project development records in accordance with professional standards and workplace procedures

3.5 Energy efficiency is assessed and documented according to relevant industry codes, standards and regulations

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out energy assessments and documenting energy efficiency strategies must include at least the following:

- two industrial properties/enterprises

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK155A Assess energy loads and uses for energy efficiency in industrial properties and enterprises.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying and quantifying the extent of the energy use, loads and patterns of usage for electrical and energy installation energy problem/s
- identifying the operational patterns in control of the user that impacts on energy use and the energy services supplied by the energy technology that allow the quantifying energy use
- performing an energy balance to model the current energy use to the existing energy bills
- identifying effective energy saving opportunities to reduce energy use
- understanding the extent of the scope of the electrical and energy installation design problems, constraints and likely cost of installation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each problem
- testing and commissioning energy saving opportunity solutions to energy problems
- documenting instructions for implementation of solutions that incorporate risk control measures to be followed
- documenting and reporting financial and technical justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to resolve/minimise energy usage
- analysing facilities orientation and floor plans, building structure plans, energy accounts and situation reports to determine extent of the energy assessment
- applying relevant work health and safety (WHS)/ occupational health and safety (OHS) requirements, including:
  - applying safe working practices
- applying sustainable energy principles and practices
- assessing industrial properties and enterprises for energy efficiency evaluation
- calculating energy and energy balance, including power calculations, usage time calculations, power factor calculations and energy conversions from kilowatt hour (kWh) to megajoules (MJ)
- calculating best practice energy and water star ratings

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- calculating energy balance for industrial facilities
- calculating greenhouse gas emissions, emissions factors, carbon intensity of electricity vs. natural gas and liquified petroleum gas (LPG) and global warming potential and carbon dioxide (CO2) equivalents
- carrying out energy assessments to address energy efficiency issues in industrial properties, including:
  - conducting thermal energy performance assessment and a water audit of an industrial facility
  - considering energy loads when determining strategies
  - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
  - determining strategies to ensure energy efficient solutions are developed and implemented
- communicating effectively with relevant stakeholders
- deploying a power and energy monitoring strategy in an industrial facility
- developing a single line schematic of electrical system and a power and energy monitoring strategy for an industrial facility
- establishing the power and energy data gap from the energy audit to achieve Australian Standard compliant energy audits
- explaining the operation of seven different power and energy monitoring equipment available
- identifying the structure and purpose of power and energy data recording for whole systems and equipment and electrical loads that need to contribute more than 5% of energy use
- identifying potential energy savings from application of energy management
- planning assessment activities/audits to meet scheduled timelines
- reporting on communication of energy audit results and power and energy data collection in an industrial facility.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- industrial properties and enterprises energy efficiency assessment, including:
  - energy management, legislation and regulation relevant to industrial properties and enterprises encompassing:
    - national Building Code of Australia (BCA)
    - Standards Australia for energy auditing
    - state/territory-based legislation for energy management in business
    - energy efficiency opportunities Act
    - state/territory energy reporting schemes
    - minimum renewable energy (RE)
    - RE credits

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    - small technology credits
- water supply and use encompassing:
    - collection and analysis of information for industrial facilities water use and methods to improve water efficiency in the industrial facilities
    - ability to analyse the water consumption index for different industrial sectors
    - ability to analyse Industrial facilities water use and ways to minimise the use of water
    - understanding on the methodology applied to water savings
    - calculate water star rating
- environmental context – greenhouse gas emissions, ecological impacts and resource use encompassing:
    - concept of greenhouse gas emissions and global warming
    - fossil fuel resource depletion and how mining impacts the environment
    - breakdown of energy consumption in the Australian industrial sector
    - breakdown of water consumption in the Australian industrial sector
- energy efficiency methodologies encompassing:
    - energy services approach and relationship to energy auditing
    - end-user focus and relationship to energy auditing
    - opportunistic approach and relationship to energy auditing
    - energy management strategy in relationship to energy efficiency, energy management, demand management, fuel switching and RE
    - financially viable best practice solutions; including net present value and internal rate of return
    - water management strategy in relationship to water efficiency, water management, source switching and water reuse/recycling
    - opportunistic best practice solutions in relationship to water and the differences to the financially viable best practice solutions
    - benchmarking with reference to statistical benchmarks, technology benchmarks and best practice financially viable benchmark methodologies
    - calculating best practice energy and water star ratings
    - property cost and environmental impact tables in relationship to reporting energy audit outcomes
    - sustainable initiative investment tables in relationship to reporting energy audit outcomes
- energy and society encompassing:
    - understanding of electricity charges
    - drivers of the predicted electricity price increases in Australia
    - network charge and retail charge increases and how they relate to electricity price
    - the carbon tax or similar and impact on electricity prices
    - RE target and impact on electricity prices
    - impact of electricity prices to industrial facilities
- energy auditing and practice encompassing:

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  - scope of Australian Standards for energy auditing
  - energy audit process in relationship to data collection, analysis and the communication of results
  - accounts, bills and data, tariff structures and the identification of industrial tariff types
  - calculating energy and energy balance, including power calculations, usage time calculations, power factor calculations and energy conversions from kWh to MJ
  - process involved in onsite assessment in an industrial facilities energy audit
  - gathering information on industrial facilities energy use and costs
  - risks and hazards associated with an industrial facilities energy audit
  - calculating energy and power
  - power rating of equipment and metering and measurement in industrial facilities energy audits
  - calculating energy balance for industrial facilities
  - advice on ways to improve energy efficiency
  - calculating greenhouse gas emissions, emissions factors, carbon intensity of electricity vs. natural gas and LPG and global warming potential and CO2 equivalents
  - financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
  - reporting and communication of energy audit results
- energy management encompassing:
  - energy management strategies
  - practice-based energy management
  - technology-based energy management
  - interaction between human resources and practice-based control
  - application of technology-based energy management
  - identify potential energy savings from application of energy management
- power and energy data recording encompassing:
  - structure and purpose of power and energy data recording for whole systems and equipment
  - review or develop single line schematic of an electrical system of an industrial facility
  - establish the power and energy data gap from the energy audit to achieve Australian Standard compliant energy audits
  - identify electrical loads that need contribute more than 5% of energy use
  - understand and explain the operation seven different power and energy monitoring equipment available
  - the implications of data recording intervals for monitoring equipment
  - develop a power and energy monitoring strategy for an industrial facility
  - deploy industrial facility power and energy monitoring strategy
  - draw conclusions and report on power and energy data collection in an industrial facility
- water auditing services and design encompassing:

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  - water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top up water use for cooling towers and pool systems
  - industrial facility water meter reading
  - trends of water use and charges for industrial facilities
  - water efficiency labelling (WELS) scheme as it relates to water auditing
  - identification of water efficiency opportunities in industrial facility assessments
  - operation of a rainwater and grey water systems
  - factors that impact on landscape water demand
- lighting services and efficient design encompassing:
  - fundamental illumination design for industrial facilities
  - illumination terms: light output, light level and brightness
  - determining target light levels for differing tasks
  - characteristics of light sources, including efficacy, colour temperature and colour rendering index
  - ballast types, their efficiency and benefits
  - incandescent lamps, light-emitting diode (LED), induction lamps, halogen lighting, industrial fluorescent lighting, metal halide, mercury vapour and comparisons between these and applications for the industrial facilities
  - application of lighting methodology for best practice energy efficiency design
  - energy saving lighting opportunities in the industrial facilities
- thermal performance and climate control encompassing:
  - thermal performance of a building impacts on heating, ventilation and air conditioning energy use including orientation, thermal mass, insulation, glazing, shading and ventilation
  - air conditioning designs including central, ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners, through wall/window and portable units
  - improvement to air movement systems in Industrial facilities, including diffusers
  - improvement to ventilation systems in industrial facilities
  - improvement of thermal performance of an industrial building envelope
  - ability to apply the knowledge of Australian climate zones
  - air conditioning technologies, including refrigerated type air conditioning, inverter type air conditioning, reverse cycle air conditioning, evaporative air conditioners, breeze power systems and digital scroll compressors
  - application of energy efficiency ratio (EER) and coefficient of performance (COP) and show proficiency in EER and COP calculations
  - application of the air conditioning star ratings to industrial facilities
  - gas and electric heating options and air (ducted) heating
  - operation of an air conditioning system and components, including the compressor, evaporator, condenser, expansion valve and fan coil
  - ceiling and pedestal fans and ventilation climate control
  - factors that impact on climate control energy consumption

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    - best practice climate control methodology as applied to the industrial facilities
    - industrial facilities climate control saving opportunities
    - conducting thermal performance assessment of industrial facilities
- product storage services and efficient design encompassing:
    - industrial refrigeration system basic operation
    - different industrial refrigeration chilling methods and system elements
    - industrial refrigeration characteristics including operation, cooling and heat loads calculations, and operational performance
    - factors that impact on industrial refrigeration energy use, including size, configuration temperature setting, heat load, cooling time, seals, insulation, compressor efficiency and age
    - industrial cold rooms and freezer rooms energy saving opportunities
    - product storage saving opportunities
- food preparation services and efficient design encompassing:
    - different food preparation appliances
    - different operation of gas and electric hot plates and ovens and the advantages and disadvantages of each
    - EMI food preparation methodology
    - food preparation saving opportunities
    - food preparation services and efficient design
- water heating services and efficient design encompassing:
    - different water heaters, including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
    - solar water heater configurations and characteristics, including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, and one-shot booster
    - renewable energy certificates (RECs) and standard test conditions (STCs) and how these relate to solar water heater STCs
    - factors that influence water heater energy use including pipework and fitting insulation, atmospheric conditions, water efficiency, temperature setting, and maintenance and operation
    - water heating/cooling calculations
    - EMI water heating methodology
    - industrial water heating saving opportunities
    - types of entertainment and administration appliances found in industrial residences
- entertainment and administration services and efficient design encompassing:
    - appliance standby power including the different mode; passive and active standby
    - appliance energy star ratings
    - minimum energy performance standards (MEPS) and labelling requirements for televisions
    - network standby management strategies

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  - computers energy consumption including computer power management
  - entertainment and administration saving opportunities
- industrial services and efficient design encompassing:
  - compressed air, hydraulic and steam systems
  - overview of industrial services in relation to industrial sector
  - compressed air, hydraulic and steam system selection and design
  - compressed air, hydraulic and steam system theory, energy balance for a typical system in industrial processes
  - energy efficiency pumping compressed air, hydraulic and steam systems design methodology
  - energy efficiency compressed air, hydraulic and steam systems
  - industrial pumping compressed air, hydraulic and steam systems saving opportunities
- industrial cogeneration services and efficient design encompassing:
  - cogeneration systems
  - overview of industrial cogeneration systems in relation to industrial sector
  - cogeneration system selection and design
  - cogeneration system theory, energy balance for a typical system in industrial processes
  - energy efficiency cogeneration systems design methodology
  - energy efficiency cogeneration systems
  - industrial cogeneration systems saving opportunities
- pumping systems (and pools) and efficient design encompassing:
  - pumping services in relation to industrial sector
  - pumping types including centrifugal and positive displacement and pump selection and design
  - pumping theory including pressure head, pressure pumping vs. transfer pumping, pump curves, pump best efficiency (operating) point (BEP), variable speed drive, energy balance for a typical pumping system and electric motors
  - operating of water pumps in industrial processes
  - energy efficiency pumping systems design methodology
  - energy efficiency pumping systems
  - industrial pumping systems saving opportunities
- smart metering solutions encompassing:
  - benefits of the different metering available to the industrial sector
  - metering opportunities relation to industrial sector
- RE (solar photovoltaic (PV)) encompassing:
  - design of solar PV systems and different panel types including mono-crystalline, poly-crystalline and amorphous
  - solar panel characteristics and choice of selection
  - solar power system utility approval process
  - balance of systems, rules of thumb, shading, orientation and shading of strings in an

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    on grid solar power system
    - solar PV energy calculations and calculate REC entitlement for a small solar PV system
    - different feed-in tariff schemes and how they apply to solar PV
  - energy audit system encompassing:
    - industrial facilities energy audit forms and legend
    - conducting energy and water audit for the industrial sector
    - industrial facilities sector energy audit report
- effective communication techniques
- RE (solar PV) systems
- performance agreements and/or workplace/industry standards
- problem-solving techniques
- relevant manufacturer specifications
- relevant parameters, specifications and performance requirements in relation to setting energy use
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures
- risk mitigation process
- sustainable energy principles and practices
- techniques to analyse facilities orientation and floor plans, building structure plans, energy accounts and situation reports.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to undertake energy audits to assess energy loads of residential, office and retail premises; evaluate the energy efficiency of the premises and to make recommendations on design implementations.

It includes working safely, applying extensive knowledge of electrical installations and components and their operating parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting engineering solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0014 Develop strategies to address sustainability issues for electrical installations

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assess residential, office and retail premises for energy efficiency	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures for relevant work area are identified and applied

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	evaluation		
		1.2	Hazards are assessed, risks are assessed and control measures implemented
		1.3	Extent of the energy assessment is determined from analysis of premises, including orientation and floor plans, building structure plans, energy accounts and situation reports in consultation with relevant person/s and in accordance with workplace procedures
		1.4	Energy assessment activities are planned to meet scheduled timelines in consultation with others involved in the work
		1.5	Strategies are determined to ensure energy efficient solutions are developed and implementation is carried out in accordance with workplace procedures
2	**Assess residential, office and retail premises for energy efficiency evaluation**	**2.1**	WHS/OHS risk control work measures and procedures are followed
		2.2	Energy loads are considered when developing energy efficient strategies to address and minimise energy use
		2.3	Parameters, specifications and performance requirements in relation to energy use are set in accordance with workplace procedures
		2.4	Approaches to resolving/minimising sustainability issues and energy use are analysed to provide the most effective solutions in accordance with workplace procedures
		2.5	Unplanned events are dealt with safely, efficiently and consistently in accordance with regulatory requirements and workplace procedures
		2.6	Quality and energy efficiency of the audit is monitored against performance agreement and/or workplace procedures and industry standards
3	**Document assessment of residential, office and retail premises for energy efficiency**	**3.1**	Proposed solutions/strategies to minimise energy use are tested to determine their effectiveness and modified, as required, in accordance with workplace procedures

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3.2 Adopted solutions are documented in accordance with workplace procedures, including instructions for implementation that incorporate the risk control measures to be followed

3.3 Authorised person/s required to implement solutions for energy use is coordinated in accordance with regulatory requirements and workplace procedures

3.4 Justification for strategies used to minimise energy use is documented for inclusion in work/project development records in accordance with professional industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out energy assessments and documenting energy efficiency strategies must include at least the following:	• two residential, office and retail premises

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK153A Assess energy loads and uses for energy efficiency in residential, office and retail premises.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying and quantifying the extent of the energy use, loads and patterns of usage for electrical and energy installation energy problem/s
- identifying the operational patterns in control of the user that impact on energy use and the energy services supplied by the energy technology that allow the quantifying energy use
- performing an energy balance to model the current energy use to the existing energy bills
- identifying effective energy saving opportunities to reduce energy use
- understanding the extent of the scope of the electrical and energy installation design problems, constraints and likely cost of installation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each problem
- testing and commissioning energy saving opportunity solutions to energy problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting and reporting financial and technical justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to resolve/minimise energy usage
- analysing facilities orientation and floor plans, building structure plans, energy accounts and situation reports to determine extent of the energy assessment
- applying sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS)requirements, including applying safe working practices and using risk control measures
- assessing residential, office and retail premises for energy efficiency evaluation
- carrying out energy assessments to address energy efficiency issues in residential, office and retail premises, including:
    - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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- collecting and analysing information on household water use and on ways to improve water efficiency in the home
- communicating effectively with relevant stakeholders
- conducting a thermal performance assessment of a domestic residence
- conducting an energy and water audit for the domestic and the small business sector
- considering energy loads when determining strategies
- determining strategies to ensure energy efficient solutions are developed and implemented
- performing a residential water meter reading
- performing energy and power calculations
- performing energy balance calculations
- performing financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
- performing greenhouse emission calculations, emissions factors, carbon intensity of electricity vs. natural gas and liquified petroleum gas (LPG) and global warming potential and CO2 equivalents
- performing solar photovoltaic (PV) energy calculations and calculate renewable energy certificate (REC) entitlement for a small solar PV system
- planning assessment activities/audits to meet scheduled timelines.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- residential, office and retail premises energy efficiency assessments, including:
  - energy management, legislation and regulations relevant to residential, office and retail premises encompassing:
    - national Building Code of Australia (BCA)
    - state/territory building codes
    - Standards Australia for energy auditing
    - mandatory disclosure
    - state/territory-based legislation for energy management in business
    - National Australian Built Environment Rating System (NABERS) tenancy
    - NABERS Basix
    - minimum renewable energy (RE)
    - Nationwide House Energy Rating Scheme (natHERS) ratings
    - RE credits
    - small technology credits
  - water supply and use encompassing:
    - collection and analysis of information on household water use and on ways to improve water efficiency in the home
    - ability to analyse the water consumption index for different sectors

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    - ability to analyse domestic water use and ways to minimise the use of water
    - understanding of the methodology applied to water savings
    - performing water star rating calculations
- greenhouse gas emissions encompassing:
    - concept of greenhouse gas emissions and global warming
    - fossil fuel resource depletion and mining impacts on the environment
    - breakdown of energy consumption in the Australian domestic sector
- environmental context – ecological impacts and resource use encompassing:
    - concept of greenhouse gas emissions and global warming
    - fossil fuel resource depletion and mining impacts on the environment
    - breakdown of energy consumption in the Australian domestic sector
    - breakdown of water consumption in the Australian domestic sector
- energy efficiency methodologies encompassing:
    - energy services approach and how it relates to energy auditing
    - end-user focus and how it relates to energy auditing
    - opportunistic approach and how it relates to energy auditing
    - energy management strategy in relation to energy efficiency, energy management, demand management, fuel switching and RE
    - financially viable best practice solutions
    - water management strategy in relation to water efficiency, water management, source switching and water reuse/recycling
    - opportunistic best practice solutions in relation to water and how this differs from financially viable best practice solutions
    - benchmarking with reference to statistical benchmarks, technology benchmarks and best practice financially viable benchmark methodologies
    - calculating best practice energy and water star ratings
    - property cost and environmental impact tables in relation to reporting energy audit outcomes
    - sustainable initiative investment tables in relation to reporting energy audit outcomes
- energy and society encompassing:
    - understanding of electricity charges
    - drivers of the predicted electricity price increases in Australia
    - network charge and retail charge increases and how they relate to electricity price
    - the carbon pollution reduction scheme impact on electricity prices
    - RE target impact on electricity prices
- energy auditing theory and practice encompassing:
    - scope of Australian Standards for energy auditing
    - energy audit process in relation to data collection, analysis and the communication of results
    - accounts, bills and data, tariff structures and the identification of domestic tariff types
    - energy and energy balance calculations, including power calculations, usage time

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calculations, power factor calculations and energy conversions from kilowatt (kW) to megajoule (MJ)
    - process involved in onsite assessment in a domestic and small business energy audit
    - ways of gathering information on household energy use and costs
    - risks and hazards associated in a domestic and small business energy audit
    - performing energy and power calculation
    - power rating of equipment and metering and measurement in a domestic and small business energy audit
    - energy balance calculations
    - ways to improve energy efficiency
    - greenhouse emission calculations, emissions factors, carbon intensity of electricity vs. natural gas and LPG and global warming potential and CO2 equivalents
    - financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
    - reporting and communication of energy audit results
- water auditing services theory and design encompassing:
    - water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top up water use for pool systems
    - residential water meter reading
    - trends of water use and charges
    - water efficiency labelling scheme (WELS) as it relates to water auditing
    - water efficiency opportunities in home sustainability assessments
    - operation of a greywater system
    - factors that impact on garden water demand
- lighting services theory and efficient design encompassing:
    - fundamental illumination design for domestic and small business
    - illumination in terms of light output, light level and brightness
    - determine target light levels for differing tasks
    - characteristics of light sources, including efficacy, colour temperature and colour rendering index
    - different ballast types, their efficiency and benefits
    - incandescent lamps, halogen lighting, domestic fluorescent lighting and comparisons between these and applications for the domestic and small business sector
    - the application of lighting methodology for best practice energy efficiency design
    - energy saving lighting opportunities in the domestic and small business sector
- thermal performance and climate control encompassing:
    - thermal performance of a building and how it impacts on heating, ventilation and air conditioning energy use, including orientation, thermal mass, insulation, glazing, shading and ventilation
    - air conditioning designs, including ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners, through wall/window

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and portable units
    - ways for improving the thermal performance of a residential building envelop elements
    - Australian climate zones
    - air conditioning technologies, including refrigerated type air conditioning, inverter type air conditioning, reverse cycle air conditioning, evaporative air conditioners, breeze power systems and digital scroll compressors
    - application of energy efficiency ratio (EER) and coefficient of performance (COP) and show proficiency in EER and COP calculations
    - application of the air conditioning star ratings
    - gas and electric heating options and air (ducted) heating
    - operation of an air conditioning system and each component, including the compressor, evaporator, condenser, expansion valve and fan coil
    - ceiling and pedestal fans and ventilation climate control
    - factors that impact on climate control energy consumption
    - best practice climate control methodology as applied to the domestic and small business sector
    - domestic and small business climate control saving opportunities
    - conducting a thermal performance assessment of a domestic residence
- food storage services theory and efficient design encompassing:
    - refrigeration system basics operation
    - different refrigeration models
    - refrigeration characteristics, including operation, automatic defrost, cooling temperature control, ice maker, ice and water dispenser, door seals and hinges
    - factors that impact on refrigerator energy use, including size, configuration temperature setting, clearance around cabinet and ambient conditions, making ice, ice and water antisweat heaters, seals, insulation, compressor efficiency and age
    - refrigerator and freezer star ratings
    - food storage saving opportunities
- food preparation services theory and efficient design encompassing:
    - different food preparation appliances
    - different operation of gas and electric hot plates and ovens and the advantages and disadvantages of each
    - EMI food preparation methodology
    - food preparation saving opportunities
    - food preparation services theory and efficient design
- water heating services theory and efficient design encompassing:
    - different water heaters, including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
    - solar water heater configurations and characteristics, including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster

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  - how renewable energy certificates (RECs) relate to solar water heater RECs
  - factors that influence water heater energy use, including pipe work and fitting insulation, atmospheric conditions, water efficiency, temperature setting and maintenance and operation
  - water heating/cooling calculations
  - EMI water heating methodology
  - domestic water heating saving opportunities
  - types of entertainment and administration appliances found in domestic residences
- entertainment and administration services theory and efficient design encompassing:
  - appliance standby power including the different mode; passive and active standby
  - appliance energy star ratings
  - minimum energy performance standards (MEPS) and labelling requirements for televisions
  - computer energy consumption, including computer power management
  - entertainment and administration saving opportunities
- cleaning services theory and efficient design encompassing:
  - clothes washer types, including vertical axis and horizontal axis
  - factors that impact on clothes washing energy use
  - energy and water MEPS star ratings and how they apply to clothes washers
  - clothes dryer types, including spin dryer, condenser dryers, gas dryers and heat pump dryers
  - clothes dryer controls
  - dishwasher types
  - vacuum cleaner types
  - EMI cleaning methodology
  - domestic cleaning saving opportunities
- pumping systems (and pools) theory and efficient design encompassing:
  - pumping services in relation to domestic and the small business sector
  - pumping types, including centrifugal and positive displacement and pump selection and design
  - pumping theory, including pressure head, pressure pumping vs. transfer pumping, pump curves, pump best efficiency (operating) point (BEP), variable speed drive, energy balance for a typical pumping system and electric motors
  - operation of domestic pools in terms of pool pumps, pool backwashing, cartridge filters, pools turnovers, pool water use and pool heating
  - energy efficiency pool systems design methodology
  - domestic pool systems saving opportunities
- smart metering solutions encompassing:
  - benefits of the different metering available to the domestic and the small business sector
  - metering opportunities relation to domestic and the small business sector

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- renewable energy (solar PV) encompassing:
  - design of solar PV Systems and different panel types, including mono-crystalline, poly-crystalline and amorphous
  - solar panel characteristics and choice of selection
  - the balance of systems, rules of thumb, shading, orientation and shading of strings in an on grid solar power system
  - performing solar PV energy calculations and calculating REC entitlement for a small solar PV System
  - different feed-in tariff schemes and how they apply to solar PV
- energy audit system encompassing:
  - domestic and small business energy audit forms and legend
  - ability to conduct an energy and water audit for the domestic and the small business sector
  - domestic and small business sector energy audit report
- effective communication techniques
- energy loads
- performance agreements and/or workplace/industry standards
- problem-solving techniques
- relevant manufacturer specifications
- relevant parameters, specifications and performance requirements in relation to setting energy use
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- techniques to analyse facilities orientation and floor plans, building structure plans, energy accounts and situation reports
- time management and planning techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) battery banks where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS battery banks.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance of RAPS battery banks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems battery banks	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system battery banks are tested in accordance with relevant workplace procedures

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	2.5	Battery bank maintenance, including performance measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of battery functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work on battery banks and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Battery bank performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK103A Conduct periodic maintenance of remote

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area power supply battery banks.

Links

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Assessment Requirements for UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- measuring and recording specific gravity of electrolyte
- measuring and recording cell voltages
- visually inspecting batteries for low electrolyte levels, electrolyte leakage, and corroded terminals and connections
- topping up low electrolyte levels
- identifying electrolyte leaks
- cleaning corroded terminals and connections and treating with an anticorrosive
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s and the local community
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) battery banks, including:
  - conducting quality checks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- RAPS systems battery bank maintenance techniques, including:
  - basic battery maintenance encompassing:

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    - scope of regular testing, checking and corrective actions
    - measurement of specific gravity and voltages of battery cells
    - checking and topping up electrolyte levels
    - checking for acid leakage, cracks in battery casing, corrosion of battery terminals and connections
    - cleaning of terminal connections and treating with an anticorrosive
- battery bank performance measurement
- methods for identification of battery bank faults
- relevant battery manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS battery banks
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) generator sets where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS generator sets.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on generator sets	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems generator sets	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system generator sets are tested in accordance with relevant workplace procedures
	2.5 Generator set maintenance, including performance

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		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of generator set functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work of generator sets and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Generator set performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining RAPS generator sets must include at least the following:

- two different systems, including:
  - where the generator set is charged from a generator set and a photovoltaic (PV) array and at least one similar RAPS system where the generator set is charged

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from a wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK104A Conduct periodic maintenance of remote area power supply generator sets.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- coordinating work with relevant personnel and the local community
- determining live electrical work testing/measurement requirements
- checking isolation of circuits/machines/systems
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) generator sets measuring and recording generator no-load and load voltages
- measuring and recording generator output for three load conditions
- checking drive engine coolant and oil level
- visually inspecting drive engine for coolant and oil leaks
- checking condition of drive engine oil, oil filter and air filter
- identifying need to change drive engine oil, oil filter and air filter
- changing drive engine oil, oil filter and air filter
- topping up low coolant and oil levels
- identifying the cause of any coolant and oil leaks
- reporting all maintenance activities
- dealing with unplanned events.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include

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knowledge of:

- RAPS system generator sets maintenance techniques, including:
  - basic generator set maintenance encompassing:
    - checking of radiator and oil level
    - periodic oil change
    - periodic air, oil and fuel filter change
    - maintaining logbooks for maintenance regime
- generator set performance measurement
- methods for identification of generator set faults
- maintenance reporting requirements
- relevant generator set manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS generator sets
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0008 Conduct periodic maintenance of remote area power supply photovoltaic arrays

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) photovoltaic (PV) arrays where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS PV arrays.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on PV arrays	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community are obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems PV arrays	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system PV arrays are tested in accordance with relevant workplace procedures
	2.5 PV array maintenance, including performance

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		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of PV array functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work are completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are completed in accordance with workplace procedures
3 Complete maintenance work of PV arrays and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	PV array performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Maintaining RAPS PV arrays must include at least the following:	• two different systems where the PV array is charged from:
	  • a generator set and a PV array
	  • a wind generator

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Exposed voltage is not greater than:	• 50 V a.c., or • 120 V d.c

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK105A Conduct periodic maintenance of remote area power supply photo voltaic arrays.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0008 Conduct periodic maintenance of remote area power supply photovoltaic arrays

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- measuring and recording array no-load and load voltages together with ambient temperature
- measuring and recording array output for three load conditions
- visually inspecting array modules and support structure for physical damage
- visually inspecting array connections and cables
- identifying array defects and faults
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking for damage or de-lamination
- checking isolation of circuits/machines/systems
- cleaning of photovoltaic (PV) modules
- coordinating work with relevant personnel and the local community
- determining live electrical work testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) PV arrays, including maintaining logbooks and maintenance regime.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

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- RAPS systems PV array maintenance techniques encompassing:
  - cleaning of PV modules
  - checking for damage or de-lamination
  - checking of module connections, connecting cable and integrity of the array structure
  - maintaining logbooks and maintenance regime
- relevant RAPS system manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practice in relation to conducting periodic maintenance of RAPS PV array
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0009 Conduct periodic maintenance of remote area power supply wind generators

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct periodic maintenance of remote area power supply (RAPS) wind generators where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, completing and reporting on maintenance of RAPS wind generators.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0023 Work safely with remote area power supply systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to conduct periodic maintenance on wind generators	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS plant are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
	1.5 Instructions for coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain RAPS systems wind generators	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits/machines/plant are isolated in strict accordance with WHS/OHS requirements and workplace procedures
	2.4 RAPS system wind generators are tested in accordance with relevant workplace procedures
	2.5 Wind generator maintenance, including performance

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		measurements and repairs, is completed safely in accordance with workplace routines and procedures
	2.6	Known types of wind generator functional faults are identified using fault-finding procedures
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Maintenance and repair work are completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.9	Quality checks are conducted in accordance with workplace procedures
3 Complete maintenance work of wind generators and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues are referred to the local community in accordance with workplace procedures
	3.4	Wind generator performance measurements are reported to relevant person/s in accordance with maintenance reporting procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK106A Conduct periodic maintenance of remote area power supply wind generators.

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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0009 Conduct periodic maintenance of remote area power supply wind generators

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- measuring and recording generator no-load and load voltages
- measuring and recording generator output for three load conditions
- visually inspecting generator and support structure for physical damage
- visually inspecting generator connections and cables
- identifying generator defects and faults
- reporting all maintenance activities
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/system
- coordinating work with relevant personnel and the local community
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- maintaining remote area power supply (RAPS) wind generators.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- RAPS systems wind generator maintenance techniques, including:
  - wind generator minor maintenance encompassing:
    - checking the integrity of support structure
    - tension of stay wires
    - visual inspection of wind generator operation

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    - maintaining logbooks and maintenance regime
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to conducting periodic maintenance of RAPS wind generators
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0010 Design energy management controls for electrical installations in buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design energy management controls for electrical installations in new buildings/structures.

It includes designing and developing energy management control methods to reduce energy use in new buildings/structures, and documenting strategies to effectively reduce energy use in the completed installation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0013 Develop strategies to address environmental and sustainability issues in the energy sector

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify energy management techniques for electrical installations in buildings	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of the energy management electrical design is determined from specifications of building and its services, plant and machinery and in consultation with relevant person/s
	1.4	Advice is sought from allied trade areas and component suppliers on required energy usage and system design in accordance with manufacturer specifications on energy usage for electrical control system
	1.5	Advice is sought from work supervisor to ensure work is coordinated effectively with relevant person/s
	1.6	Tools, testing devices and materials needed to carry out work are obtained and checked for correct operation and safety
2 Design energy management controls for electrical installations	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Inspection, tests and measurements are carried out in accordance with WHS/OHS requirements and workplace procedures
	2.3	Energy use of building services, plant and machinery is obtained and applied to the energy management design control process
	2.4	Energy evaluation tests are set up in accordance with inspection and test methods and workplace procedures
	2.5	Strategies to reduce electrical system energy use without compromising occupancy standards are developed in accordance with energy management techniques and evaluation test results
	2.6	Unexpected situations are dealt with safely and effectively in accordance with workplace procedures and approval relevant person
	2.7	Design and electrical installation evaluation is carried out without unnecessary damage to systems circuits, the surrounding environment or services using sustainable energy practices

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3	**Document energy management strategies to effectively reduce energy use in building**	**3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Results of energy management design controls, recommended electrical installation strategies and their criterion for energy reduction are documented in accordance with workplace procedures
		3.4 Plans, wiring diagrams and specifications are completed and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing energy management controls for electrical installations in buildings must include at least the following:	• two building types

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK146A Design energy management controls for electrical installations in buildings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0010 Design energy management controls for electrical installations in buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and includes:

- determining the extent of the design
- setting up and conducting appropriate examinations and tests
- reporting evaluation including recommendation for improving energy efficiency
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- designing energy management controls for electrical installations in buildings/structures
- preparing to design energy management controls for electrical installations in buildings/structures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- building management control systems, including:
  - functions of a building management system (BMS) encompassing:
    - autonomous functions
    - input/output (I/O)
    - general I/O
    - installation management items
    - energy management
    - risk management
    - information processing
    - objectives
    - building running costs

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    - smoke control as per AS 1668.1 The use of ventilation and air conditioning in buildings Fire and smoke control in buildings
  - BMS hardware encompassing:
    - system architecture
    - communication devices
    - substations
    - personal computers
    - interfaces with other systems
  - I/O functions encompassing:
    - digital I/O
    - digital output with status feedback
    - analogue I/O
    - sensors
    - alarms
  - energy management encompassing:
    - night cycle
    - optimum stop/start
    - time and event programs
    - night purge
    - outside air percentage control
    - enthalpy control
    - power demand control
    - duty cycle
    - presence detection
    - lighting control
  - information processing functions encompassing:
    - computer systems
    - central system management
    - programs
    - system configuration and security
    - operator - machine interface
    - data points
  - risk and maintenance management encompassing:
    - system files
    - fire and intruder control
    - access control
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

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- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing energy management controls for electrical installations in buildings
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0011 Design grid-connected photovoltaic power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design grid-connected photovoltaic (PV) power supply systems.

It includes preparing to design, and developing and obtaining approval for grid connected power supply systems. It also includes designing grid-connected PV power supply system installation, following design briefs, incorporating schemes for protection of persons and property from dangers of system malfunctions, ensuring safety and performance standards and functional requirements are meet, and documenting design calculations and criteria.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design a grid-connected PV power supply system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied

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		1.2	Grid system is determined from design brief
		1.3	Industry regulations and job requirements are identified and applied to work in accordance with workplace procedures
		1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s
2	**Develop a grid-connected PV power supply system design**	**2.1**	Grid-connected power supply systems, performance standards and compliance methods are applied to the design
		2.2	Alternative arrangements for hybrid power systems design is considered based on the requirements outlined in the design brief
		2.3	Safety, functional and budgetary considerations are incorporated in design
		2.4	Grid-connected power supply system design draft is checked for compliance with the design brief, industry regulations, job requirements and workplace procedures
		2.5	Grid-connected power supply system design is documented and submitted to relevant person/s for authorisation
		2.6	Unplanned situations are responded to in accordance with workplace procedures
3	**Obtain approval for grid-connected PV power supply system design**	**3.1**	Grid-connected power supply system design is presented and explained to client and/or relevant person/s
		3.2	Requests for alterations to design are negotiated with relevant person/s in accordance with workplace procedures
		3.3	Final design is documented and authorisation obtained from relevant person/s
		3.4	Quality of work is monitored against workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK135A Design grid-connected photovoltaic power supply systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0011 Design grid-connected photovoltaic power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- designing grid-connected photovoltaic (PV) power supply system
- identifying and applying industry regulations
- meeting scheduled timelines
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- PV power systems design principles, including:
  - site survey encompassing:
    - declination angle, reflectance, sunshine hours, extra-terrestrial irradiation
    - energy efficiency techniques relevant for domestic dwelling and commercial premises to reduce the electrical energy demand
    - energy efficient initiatives that could be implemented by the site owner
    - assessing WHS/OHS risks when working on a particular site
    - solar access for the site
    - shading and estimates of its effect on the system
    - solar resource for the site
    - available area for the solar array

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    - roof is suitable for mounting the array
    - modules mounted on the roof
    - switchboard or distribution board is located for connecting the output of inverter
    - array junction box (if required) and location of inverter
    - cabling route and estimates of the lengths of the cable runs
    - monitoring panels or screens and determining a suitable location with the site owner
- PV arrays selection encompassing:
    - selection and sizing of PV array for a grid-connected inverter system, based on annual energy demand, budget constraints, architectural constraints or limitations on available inverter sizes
    - determining the minimum and maximum number of PV modules in a string for the specified voltage
- system components selection encompassing:
    - balance of the system components, including cabling, circuit protection and isolation equipment for a grid-connected PV system
    - energy yield, specific energy yield and performance ratio for system
    - schematic diagrams of common grid-connected inverter circuit configurations, including metering arrangements, isolation and connection with respect to residual circuit devices (RCDs)
    - major installation details for a proposed grid-connected inverter system, based on the requirements set out in AS/NZS 4777 Grid connection of energy systems via inverters and AS/NZS 5033 Installation and safety requirements for photovoltaic (PV) arrays
- other design considerations encompassing:
    - major non-technical considerations impacting on the design, installation and operation of grid-connected PV systems, including economic, financial, contractual, institutional, legislative and regulatory
    - calculation of the annual reduction in greenhouse gas emissions achieved by a given PV power system at a given location
- inverters encompassing:
    - types of inverters used in grid connected systems
    - Australian Standard symbol for a low voltage (LV) inverter
    - the basic function of an inverter
    - simple block diagram of a typical inverter used in grid-connected system
- inverter operation encompassing:
    - the basic principle of operation of a single phase inverter (using switch analogue)
    - the operation of an inverter bridge and half-bridge configuration
    - operation of a FET inverter
    - connection of a grid inverter and measurement of the inverter parameters for various loads
- inverter characteristics encompassing:
    - the characteristics which distinguish inverters suitable for grid-connected PV array application from standard inverters

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  - using waveform diagrams, the function of PWM techniques in square wave, modified square wave and synthesised sine wave inverters
  - output voltage waveforms for square wave, modified square wave and synthesized sine wave inverters showing typical voltages and periodic times
  - the six (6) essential inverter specifications
- PV grid-connected system operation encompassing:
  - block diagram of a PV grid-connected system
  - operation of grid interactive PV systems, including synchronisation, safety feature, power flow control, passive and active anti-islanding, and metered energy for systems
  - schematic diagrams of common grid-connected inverter circuit configurations, including metering arrangements, isolation and connection with respect to RCDs in accordance with AS/NZS 4777.1 Grid connection of energy systems via inverters - Installation requirements
- grid-connected inverter selection encompassing:
  - operating window of the inverter for the expected minimum and maximum effective cell temperatures
  - selection of an inverter rating with respect to the output power of the array/s
  - major installation requirements for all system components which will ensure correct operation, long life, safety and ease of maintenance consistent with AS/NZS 4509 Stand-alone power systems, AS 4086.2 Secondary batteries for use with stand-alone power systems - Installation and maintenance, AS/NZS 3000 and relevant WHS/OHS guidelines
  - selection of a suitable location for the PV array, inverter and other components, at a given installation site in accordance with AS 2676.2 Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings - Sealed cells and AS 3011.2 Electrical installations - Secondary batteries installed in buildings Sealed cells, and the considerations given in AS/NZS4509 Stand-alone power systems and AS 4086.2 Secondary batteries for use with stand-alone power systems - Installation and maintenance
  - typical installation configurations for grid connection of energy systems via inverters
  - function and operation of a grid protection device as specified in AS/NZS 4777 Grid connection of energy systems via inverters
  - draft array wiring plan for series connected modules to minimise power loss due to shading at a particular site
  - installation requirements for a grid connected system
  - labelling and signage requirements for switchboards supplied with power from grid connected inverters, as set out in AS/NZS 4777.1 Grid connection of energy systems via inverters Installation requirements
  - the additional requirements for UPS systems as specified in AS/NZS 4777.1 Grid connection of energy systems via inverters - Installation requirements
- relevant manufacturer specifications
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements

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- relevant workplace documentation
- relevant workplace policies and procedures
- budgeting methods
- design briefs
- grid systems
- hybrid power systems
- quality assurance requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0012 Develop effective engineering strategies for energy reduction in buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop effective engineering strategies for energy reduction in buildings.

It includes developing and documenting engineering strategies/methods to effectively reduce energy use in buildings. It also includes documenting and reporting engineering strategies for energy reduction in buildings.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0013 Develop strategies to address environmental and sustainability issues in the energy sector

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify engineering energy strategies for a building	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied

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	1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3	Scope of engineering evaluation is determined from specifications of building, services, plant and machinery and in consultation with relevant person/s
	1.4	Advice is sought from work supervisor to ensure work is coordinated effectively with relevant person/s
	1.5	Tools, testing devices and materials needed to carry out work are obtained and checked for correct operation and safety
2 Develop engineering strategies for energy reduction in a building	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Inspection, tests and measurements are carried out in accordance with WHS/OHS requirements and workplace procedures
	2.3	Energy use of building, services, plant and machinery is obtained and applied to the engineering evaluation process
	2.4	Energy evaluation tests are set up in accordance with inspection and test methods and workplace procedures
	2.5	Engineering strategies to reduce energy use without compromising occupancy standards are developed in accordance with energy management techniques and evaluation test results
	2.6	Unexpected situations are dealt with safely and effectively in accordance with the approval of relevant person/s
	2.7	Engineering evaluation is carried out without damage to systems, circuits, the surrounding environment or services using sustainable energy practices
3 Document and report engineering strategies for energy reduction in building	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Results of energy use evaluation and recommended engineering strategies and their criterion for energy reduction are documented in accordance with workplace procedures

3.4 Engineering energy reduction report is completed and forwarded to relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering strategies for effective energy reduction must include at least the following:

- two buildings

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK151A Develop effective engineering strategies for energy reduction in buildings.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0012 Develop effective engineering strategies for energy reduction in buildings

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- determining the extent of the evaluation
- setting up and conducting appropriate examinations and tests
- reporting evaluation including recommendation for improving energy efficiency
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- developing sustainable engineering strategies for energy reduction in buildings
- documenting and reporting engineering strategies for effective energy reduction in buildings
- planning to develop strategies for effective energy reduction in buildings.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- energy efficient building design, including:
  - climate and thermal comfort encompassing:
    - characteristics of the different Australian climatic types
    - use of climatic data in published and electronic forms to extract the quantities relevant to energy efficient design
    - relationship between climate and comfort using bioclimatic or psychrometric charts
    - calculation of heating or cooling degree days or degree hours for various locations
    - calculation of thermal neutrality for a given location
  - solar geometry and radiation encompassing:

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    - definition of the terms: declination, hour angle, zenith angle, azimuth and altitude angles, and the equation of time
    - conversion of solar time to local time and vice versa
    - position of the sun and the length of shadows with the aid of algorithms, tables, sun charts or computer software
    - daily irradiation incident on a wall, window or roof of a given tilt and orientation
    - relative summer and winter irradiation of windows facing the cardinal orientations
- heat transfer encompassing:
    - thermal processes of conduction, convection and radiation apply to the transfer of heat in buildings
    - calculation of the summer and winter U-values of building elements using tables and software
    - calculation of the infiltration heat transfer in a building
- glazing systems encompassing:
    - different types of glazing systems and their characteristics
    - different types of shading devices and the window orientations for which they are most appropriate
    - solar heat gain for different glazing types and angles of incidence
    - calculation of the average daily irradiation of a window partly shaded by eaves, using computer software
    - calculation of the average daily heat gain through a window partly shaded by eaves
- insulation encompassing:
    - different types of insulation and where they are used
    - how different types of insulation are installed in roofs, walls and floors
    - determination of the minimum R-values of roof insulation for different locations using Australian Standard AS 2627 Thermal insulation of dwellings or similar standards
- thermal mass encompassing:
    - advantages and disadvantages of using substantial thermal mass in different climate types and for different heating and cooling regimes
    - where thermal mass can be located in a building
    - definition of the following terms: time lag, decrement factor, admittance and response factor
- comfort control strategies encompassing:
    - interpretation of the usefulness of a design strategy with the aid of a psychrometric chart showing control potential zones for a particular location
    - selection of the most useful comfort control strategies for Australian climatic regions
- energy efficiency in buildings encompassing:
    - determination of the direction of the following: both true and magnetic, north winter and summer sunrise, winter and summer sunset
    - solar access in summer and winter to various possible house locations on a site and room locations within the house
    - how vegetation can be used to both funnel and deflect wind

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    - using cross ventilation as a cooling strategy
- thermal performance of a building encompassing:
    - heating requirements of a building using the heating degree day or hour method
- dynamic performance predicted by a computer simulation program such as nationwide house energy rating scheme (NatHERS) or building energy rating scheme (BERS) integration of active solar systems encompassing:
    - active solar system types available which can provide hot water, space heating and cooling
    - the best location on the roof, and the optimum tilt and orientation of the collector panels
    - function of the main components of an air or water-based solar space heating system
    - schematic of the fluid circuit of an air or water-based space heating system
    - main solar cooling system types
- energy rating schemes encompassing:
    - differences in approach used by house energy rating schemes in Australia
    - energy performance of a number of houses using a computer simulation program such as NatHERS or BERS
    - other methods to reduce energy consumption within and outside a building, including appliance efficiency, human behaviour changes, building management strategies and transportation minimisation
    - additional cost of energy efficiency measures and cost savings using life cycle cost or simple pay back methods according to AS 3595 and AS/NZS 4536 Life cycle costing
- sustainable and safe building materials encompassing:
    - common building materials and their embodied energy content
    - environmental impact of the production of various building materials
    - problems associated with the use or disposal of building materials
- engineering principles
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do

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so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing strategies for effective energy reduction in buildings
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0013 Develop strategies to address environmental and sustainability issues in the energy sector

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop strategies to address environmental and sustainability issues in the energy sector.

It includes determining, developing and documenting environmental and sustainability issues strategies in the energy sector.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine environmental and sustainability issues	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed, and control measures and workplace procedures are

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		implemented in preparation for work
	1.3	Scope of the environmental and sustainability issues are determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4	Activities are planned to meet scheduled timelines in consultation with person/s involved in the work
	1.5	Strategies are determined, and solutions developed and implemented in accordance with workplace procedures
2 Develop environmental and sustainability strategies	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Environmental sustainability principles are applied to develop strategies to address greenhouse gas and sustainability issues
	2.3	Parameters, specifications and performance requirements in relation to environmental and sustainability issues are determined in accordance with workplace procedures
	2.4	Resolving environmental and sustainability issues is analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively in accordance with regulatory requirements and workplace policies
	2.6	Quality of work is monitored in accordance with performance agreement and/or workplace procedures or industry standards
3 Document environmental and sustainability strategies	**3.1**	Strategies to resolve environmental and sustainability issues are tested to determine their effectiveness and modified, as required
	3.2	Adopted strategies are documented and instructions for implementation and risk control measures developed
	3.3	Competent person/s required to implement strategies to environmental and sustainability issues are identified and coordinated in accordance with regulatory requirements and workplace policies
	3.4	Justification for strategies used to address environmental and sustainability issues is documented and included in

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	work/project records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Addressing environmental and sustainability issues must include the following:	• developing engineering strategies for at least two energy sector problems
Typical sustainability issues are those encountered in meeting sustainability performance standards and must include at least the following:	• reducing needs for energy use • reducing causes of greenhouse gas emissions • revising energy system operating parameters • dealing with energy system efficiencies

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK132A Develop strategies to address environmental and sustainability issues in the energy sector.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0013 Develop strategies to address environmental and sustainability issues in the energy sector

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining the extent of the energy sector problems/issues
- developing strategies to address environmental and sustainability issues
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- forming effective strategies for solution development and implementation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each issue.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- common issues/problems in a sustainable energy sector environment
- efficient and sustainable energy use and supply, including techniques for reducing the greenhouse gas intensity of energy supply
- environmental and sustainability strategies
- greenhouse best practice in industrial processes and waste management, including types and methods of reducing greenhouse gas emissions from industry

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- greenhouse gas emissions profile
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and facilities currently used in industry
- resources that reflect current industry practices in relation to developing strategies to address environmental and sustainability issues
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0014 Develop strategies to address sustainability issues for electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop strategies to address sustainability issues for electrical installation.

It includes identifying, developing and documenting strategies to address sustainability issues. It also includes developing strategies to address greenhouse gases and sustainability issues for residential, commercial and industrial electrical installations; gathering and analysing data and applying problem-solving techniques.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify sustainability issues for electrical installation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied

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		1.2 Hazards are identified, risks are assessed and control measures implemented
		1.3 Extent of sustainability issues are determined from performance specifications, situation reports and in consultation with relevant person/s
		1.4 Work activities are planned to meet scheduled timelines in consultation with relevant person/s
		1.5 Strategies are determined to ensure solution development and implementation is completed
2	**Develop strategies to address electrical installation sustainability issues**	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
		2.2 Sustainability principles are applied to develop strategies to address greenhouse gas emissions
		2.3 Parameters, specifications and performance requirements of sustainability issues are determined in accordance with workplace procedures
		2.4 Solutions for sustainability issues are analysed and selected
		2.5 Unplanned situations are responded to in accordance with regulatory requirements and workplace procedures
		2.6 Quality of work is monitored against workplace procedures
3	**Document strategies for electrical installation sustainability issues**	**3.1** Solutions to sustainability issues are tested for effectiveness and modified, as required
		3.2 Final solutions are documented, including instructions for implementation, and relevant person/s notified in accordance with workplace procedures
		3.3 Person/s authorised and qualified to implement solutions to sustainability issues is consulted in accordance with workplace procedures
		3.4 Solutions used to solve sustainability issues are justified and documented in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK152A Develop strategies to address sustainability issues for electrical installations

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0014 Develop strategies to address sustainability issues for electrical installations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the extent of the electrical installation energy problem/s
- forming effective strategies for solution development and implementation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each problem
- testing solutions to energy problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing and selecting solutions for sustainability issues
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- consulting authorised person/s qualified in implementing solutions for sustainability issues
- identifying, developing and documenting strategies to address sustainability issues
- meeting scheduled timeframes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical installation energy sustainability strategies, including:
  - energy management, legislation and regulation encompassing:
    - energy management
    - climate change
    - greenhouse effect/greenhouse gases
    - standards and codes

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    - legislation and regulations
    - energy audits
  - electrical motors, pumps and fans encompassing:
    - motor construction, components and losses
    - motor efficiency (AS/NZS 1359.5 Rotating electrical machines - General requirements - Three-phase cage induction motors - High efficiency and minimum energy performance standards requirements)
  - appliances encompassing:
    - energy star ratings
    - washing machines
    - clothes dryers
    - dishwashers
    - televisions and computers
    - standby management strategies
  - energy efficient lighting encompassing:
    - lighting efficiency
    - efficient lighting design
    - ballasts
    - lighting controls
  - water heating encompassing:
    - water heating systems and losses
    - electric, gas, oil, heat pump and solar water heater design
    - control strategies
  - space heating and cooling encompassing:
    - space heating systems and losses
    - space cooling systems and losses
    - heating - electric, gas, oil, heat pump and solar heater design
    - cooling – direct expansion, chilled water and ventilation
    - control strategies
  - solar energy encompassing:
    - system design fundamentals
    - solar photovoltaic (PV) design elements
    - solar PV system performance
    - analysis of system capital and operating cost performance
- quality assurance
- relevant job safety assessments or risk mitigation processes, including risk control measures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures

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- solution development and implementation techniques and strategies
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0015 Implement and monitor energy sector environmental and sustainable policies and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to implement and monitor energy sector environmental and sustainable policies and procedures.

It includes preparing, planning, implementing, monitoring and completing environmentally sustainable work practice management policies and procedures. It also includes collecting, interpreting and applying environmental management information, identifying environmental impacts and assessing risks.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to implement and monitor environmentally sustainable work procedures	**1.1** Works schedule/s, drawings, plans and material lists are obtained and analysed in accordance workplace procedures

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	1.2	Work is prioritised and sequenced following consultation with others for time, quality and in accordance with workplace procedures
	1.3	Relevant environmental standards and workplace procedures for work are distributed to relevant personnel and relevant worksites
	1.4	Work health and safety (WHS)/occupational health and safety (OHS) hazards are identified, risks assessed, and control measures implemented and monitored in accordance with workplace procedures
	1.5	Personnel, equipment, tools and personal protective equipment (PPE) required for work are identified, scheduled, coordinated and confirmed safe and in working order
	1.6	Risk management process is applied to work to minimise energy wastage in accordance with workplace procedures
	1.7	Items for installation are sourced in accordance with sustainable energy practices and consultation and agreement of relevant person/s
2 Implement and monitor environmentally sustainable work procedures	**2.1**	Sustainable energy practices are implemented and monitored in consultation with relevant person/s in accordance with time, quality and minimum waste, and workplace procedures and relevant industry standards are followed
	2.2	Unplanned event/situation/s are identified and responded to in accordance with relevant industry standards
	2.3	Quality checks of the work are undertaken in accordance with relevant industry standards and workplace procedures
3 Complete and review environmental and sustainable energy procedures	**3.1**	Work is checked against work schedule for anomalies to be reported and solutions identified in accordance with workplace procedures
	3.2	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.3	Tools, equipment, surplus resources and materials are

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cleaned, checked and returned to storage in accordance with workplace procedures

3.4 Materials suitable for recycling and/or reuse are identified and stored for use or disposal in accordance with sustainable energy practices and workplace procedures

3.5 Implementing and monitoring of sustainable work practices are reviewed and updated in accordance with workplace procedures

3.6 Relevant work permit/s are signed off and the work completed/returned to service and advice provided to client/customer in accordance with requirements

3.7 New targets for energy minimisation are in accordance with sustainable energy practices and workplace procedures

3.8 Successful strategies are promoted and, where possible, participants rewarded

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK145A Implement and monitor energy sector environmental and sustainable policies and procedures.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0015 Implement and monitor energy sector environmental and sustainable policies and procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- implementing and monitoring participative arrangements for the management of environmentally sustainable work practice
- implementing and monitoring the procedures for environmentally sustainable work practice
- implementing and monitoring the procedures for identifying hazards, assessing risks and controlling risks
- implementing and monitoring the procedures for maintaining environmentally sustainable work practice records
- implementing and reviewing sustainable energy procedures
- planning, implementing and monitoring environmentally sustainable work procedures
- providing environmentally sustainable work practice information to the work group.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- environmentally sustainable work principles, including:
  - relevant environmental legislation
  - sustainable practice
  - effects of neglecting sustainable practice
  - benefits of sustainable initiatives
  - techniques for reducing the use of carbon-based energy sources and hence greenhouse gas emissions

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  - domestic, commercial and industrial strategies
  - trade-related technologies and methods
  - renewable energy (RE) technologies
  - energy efficient retrofits
- implementing and monitoring, including:
  - principles and practice of effective sustainable practice management
  - workplace sustainable work practice non-compliance, range and selection of control measures
  - organisational systems and policies and procedures
  - impact of characteristics and composition of the workforce on sustainable practice management
  - sustainable work practice management to other organisational management policies, procedures and systems.
  - analysis of work environment and sustainable work practice interventions
  - analysis of relevant workplace data
  - ability to assess resources needed for risk control
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used should reflect current industry practices in relation to implementing and monitoring policies and procedures for environmentally and sustainable electrotechnology work practice
- applicable documentation, including workplace procedures, equipment specifications,

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regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0016 Install, configure and commission LV grid-connected photovoltaic power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install and commission a low voltage (LV) photovoltaic (PV) power system to the grid power system.

It includes working safely and to industry installation standards, matching PV components specified for a given location, placing and securing system components accurately, making required circuit connections and completing the necessary installation documentation.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Note: Those holding an Unrestricted Electrician's Licence or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

Pre-requisite Unit

UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to install PV power system	**1.1** Nature and location of the PV work is determined from documentation, diagrams or relevant person/s to determine the scope of work to be undertaken
	1.2 WHS/OHS requirements and workplace procedures for a given work area are obtained and applied
	1.3 Hazards are identified, risks assessed, control measures and workplace procedures implemented
	1.4 Installation and/or alteration of the PV system is planned in consultation with persons effected by the work and sequenced appropriately
	1.5 PV array mounting methods and roof orientation is determined in accordance with relevant industry standards
	1.6 Location of PV system components is planned within the constraints of the building structure, significants and regulations
	1.7 Material for the PV installation work is obtained in accordance with workplace procedures and checked against relevant diagrams and job requirements prior to installation
	1.8 Need to test or measure live electrical work is determined in accordance with workplace safety procedures
	1.9 Tools, equipment and measuring devices required for the PV installation work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Install LV PV power system	**2.1** Electrical WHS/OHS risk control measures and workplace procedures associated with extra-low voltage (ELV) and LV PV power system are followed
	2.2 Circuits/machines/plant are checked as isolated in accordance with WHS/OHS requirements and

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		workplace procedures
	2.3	PV system components are installed to comply with industry technical standards, job specifications and system requirements and with sufficient access to affect terminations, adjustment and maintenance
	2.4	Wiring is terminated at components and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
	2.5	Unplanned situations are dealt with safely in accordance with workplace procedures in a manner that minimises risk to personnel and equipment and with the approval of an authorised person
	2.6	PV system installation is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles
	2.7	Checks of installed apparatus quality and components are undertaken in accordance with workplace procedures
3 Complete and report PV installation activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Final inspections and tests are made to the installed apparatus to ensure installation conforms to job requirements, industry technical standards and manufacturer specifications

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Install, configuring and commissioning LV grid-connected PV power systems must	• installing PV power systems in at least two different types of premises, construction or

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include: environment

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK148A Install, configure and commission LV grid-connected photovoltaic power systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0016 Install, configure and commission LV grid-connected photovoltaic power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - checking tools, materials, equipment and testing devices for correct operation and safety
  - ensuring circuits are isolated
  - terminating wiring correctly and safety
  - testing or measuring low voltage (LV) photovoltaic (PV) power and operating systems safely
  - using risk control measures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- installing and setting up grid-connected PV system, including:
  - applying appropriate array mounting methods for roof sections
  - connecting grid inverter and measuring inverter parameters for various loads
  - placing and securing system components, including PV array
  - reading and interpreting drawings/diagrams related to apparatus locations and circuit connections
- tilting and adjusting angle of roof mounted and free-standing PV array frame construction
- connecting and commissioning at least one PV product in accordance with industry standards and regulations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- PV array installation requirements, including:
  - WHS/OHS requirements and methods for working on roofs
  - common methods of roof construction (rafters and tile battens) and methods to ensure

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integrity of waterproofing
  - common types of roof mounted and free-standing PV array frame construction and methods of tilt angle adjustment
  - fixing methods for different roof types
  - array mounting methods for north orientation roof sections and non-north facing roof sections
  - aesthetic considerations in choosing an appropriate array location and type of mounting
  - the mounting and fixing methods for at least one type of commercially available building integrated PV product
- electrical PV array installation requirements, including:
  - methods used in wiring and connecting PV arrays in accordance with relevant industry standards
  - considerations involved in wiring of series connected PV modules to minimise power losses due to shading
  - PV array wiring diagram including the placement of blocking and bypass diodes
  - considerations involved in choosing the location of associated system equipment, including regulators, direct current (d.c.) control board, inverters and inverters for grid-connected systems
  - cable route from PV array/s to inverters to minimise the route length
- system installation and maintenance including:
  - installation work on a PV power system in accordance with relevant industry standards and WHS/OHS guidelines
  - correct isolation and shutdown procedures prior to carrying out maintenance tasks
  - routine maintenance tasks on PV arrays
  - required vegetation control to remove or reduce shading or soiling on a PV array
- inverters, including:
  - types of inverters used in grid-connected systems
  - industry standard symbol for a LV inverter
  - the basic function of an inverter
  - simple block diagram of a typical inverter used in grid-connected system
- inverter operation, including:
  - the basic principle of operation of a single phase inverter (using switch analogue)
  - the operation of a field effect transistor (FET) inverter, an inverter bridge and half-bridge configuration
  - connection of a grid inverter and measurement of the inverter parameters for various loads
- inverter characteristics, including:
  - the characteristics which distinguish inverters suitable for grid-connected PV array application from standard inverters
  - using waveform diagrams, the function of pulse width modulator (PWM) techniques in square wave, modified square wave and synthesised sine wave inverters

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  - output voltage waveforms for square wave, modified square wave and synthesised sine wave inverters showing typical voltages and periodic times
  - the six (6) essential inverter specifications
- PV grid-connected system operation, including:
  - block diagram of a PV grid-connected system
  - operation of grid interactive PV systems, including synchronisation, safety feature, power flow control, passive and active anti-islanding, and metered energy for systems
  - schematic diagrams of common grid-connected inverter circuit configurations, including metering arrangements, isolation and connection with respect to residual current devices (RCDs) in accordance with relevant industry standards
- installation of grid-connected inverters, including:
  - major installation requirements for all system components which will ensure correct operation, long life, safety and ease of maintenance consistent with relevant industry standards and WHS/OHS guidelines
  - selection of a suitable location for the PV array, inverter and other components, at a given installation site in accordance with relevant industry standards
  - typical installation configurations for grid connection of energy systems via inverters
  - the function and operation of a grid protection device as specified by relevant industry standards
  - array wiring plan for series connected modules to minimise power loss due to shading at a particular site
  - installation requirements for a grid-connected system
  - labelling and signage requirements for switchboards supplied with power from grid connected inverters, as set out in the relevant industry standards
  - the additional requirements for UPS systems as specified in the relevant industry standards
  - installation of a PV grid-connected system
- system commissioning and maintenance, including:
  - the isolation procedures required for grid-connected inverters
  - relevant commissioning procedures, including start-up and shutdown procedures for grid-connected inverter systems in accordance with relevant industry standards
  - testing a grid-connected inverter system for correct operation
  - location and rectification of an electrical fault within a PV array/inverter and wiring
  - maintenance schedule for a grid-connected PV power system
  - performing commissioning work on a PV power system in accordance with relevant industry standards.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0017 Maintain and repair facilities associated with remote area essential service operations

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and repair facilities associated with remote area essential service operations.

It includes preparing for, conducting, completing and reporting on maintenance and repair of facilities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

or

UEECD0042 Solve problems in ELV single path circuits

UEECD0044 Solve problems in multiple path circuits

Competency Field

Renewable Energy

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain and repair facilities	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote are power supply (RAPS) plant are identified and applied in accordance with workplace routines and procedures
	1.2 Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of service facilities are obtained from documentation or from relevant person/s to determine the scope of work
	1.5 Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
	1.6 Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain and repair facilities	**2.1** Workplace risk control measures and procedures are applied
	2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Facilities are checked to identify deterioration and damage in accordance with workplace procedures

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	2.4	Faulty and damaged facilities are repaired in accordance with workplace procedures
	2.5	Maintenance and repairs are carried out safely and within the prescribed limits, routines and procedures
	2.6	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.7	Maintenance and repair work is conducted minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.8	Quality checks are conducted in accordance with instructions and workplace procedures
3 Complete maintenance and repair work report	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
	3.4	Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK117A Maintain and repair facilities associated

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with remote area essential service operations.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0017 Maintain and repair facilities associated with remote area essential service operations

Modification History

Release 2. This minor update is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Typographic error in prerequisite option requirements fixed.

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two different remote area essential service operations and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- completing maintenance and repairs
- completing relevant documentation/reporting
- conducting quality checks
- coordinating work with relevant person/s
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining scope of work from documentation and/or relevant person/s
- identifying and accessing materials, tools, equipment and testing devices
- identifying deterioration and damage to facilities
- identifying maintenance issues beyond the scope of work and notifying relevant person/s
- maintaining and repairing remote area essential service operations facilities
- preparing for maintenance and repair work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- maintenance of remote area essential services facilities, including:
  - repair and maintenance of:
    - fences and gates

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    - windows
  - function/s of relevant electrical components
  - basic mathematical operations
  - electrical safety procedures
  - essential services facilities - lighting
  - essential services facilities - safety and security and emergency checks
  - firefighting equipment and operation
  - generation and distribution of electricity
  - identification and reporting of faulty electrical components
  - maintenance painting
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0018 Maintain and repair remote area power generation facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and repair remote area power generation facilities.

It includes preparing for, conducting and reporting on maintenance and repair of remote area power generation facilities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEERE0019 Maintain safety and tidiness of remote area power supply systems

UEERE0023 Work safely with remote area power supply systems

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain and repair remote area power generation facilities	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote area power generation facility are identified and applied in accordance with workplace routines and procedures
	1.2 Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 Nature and location of remote area power station facility is obtained from documentation or from relevant person/s to determine the scope of work
	1.5 Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
	1.6 Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
	1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Maintain and repair remote area power generation facilities	**2.1** Workplace risk control measures and procedures are applied
	2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.2 Inspection repairs, replacements and/or adjustments are completed on items listed in the maintenance schedule and in accordance with workplace procedures
	2.3 Fuel, coolant, oil and other fluid spills are cleaned and area made safe in accordance with workplace procedures

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	2.4	Batteries are serviced and/or replaced as specified in the maintenance schedule and in accordance with workplace procedures
	2.5	Consumables are removed and disposed of in accordance with environmentally safe procedures
	2.6	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.7	Quality checks are conducted in accordance with instructions and workplace procedures
3 Report maintenance and repair of remote area power generation facilities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
	3.3	Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK116A Maintain and repair remote area power generation facilities.

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Links

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Assessment Requirements for UEERE0018 Maintain and repair remote area power generation facilities

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the location and nature of the work required
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- determining scope of work from documentation and/or relevant person/s
- identifying and accessing materials, tools, equipment and testing devices
- coordinating work with relevant person/s
- checking isolation of circuits/machines/systems
- correctly inspecting, repairing, replacing and adjusting items listed in the maintenance schedule
- maintaining and repairing remote area power generation facilities
- servicing batteries and battery packs in a community power station
- cleaning fluid spills appropriately
- removing and disposing of consumable following environmentally safe procedures
- conducting quality checks
- dealing with unplanned events
- applying environmentally safe work practices
- completing relevant documentation/reporting.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- remote area essential services power plant, including:
  - minor service and maintenance procedures of diesel-powered generation equipment in accordance with a prepared schedule encompassing:
    - types and grades of inspections, repairs, replacement and/or adjustments under a maintenance schedule:
      - replacement items/materials, including engine oil, oil filters, fuel filters, engine

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coolant system filters, air cleaners and fan belts
    - inspection and repair items, including leakages from fuel system, coolant system and lubricating oil system
  - cleaning of fluid spills
  - environmentally safe procedures for removal and disposal of consumables
- servicing batteries and battery packs in a community power station in accordance with the prepared maintenance schedule encompassing:
  - hazards associated with batteries
  - types of batteries and their application in a community power station (starting battery set and switchboard (nicad) batteries)
  - battery maintenance techniques
- schedule regular servicing and maintenance encompassing:
  - engine oil and filter changes
  - fuel filters
  - coolant filters
  - water trap devices
  - drive belt (condition/adjustment)
  - valve adjustments (if applicable)
  - major and minor mechanical servicing by outside agents
  - air cleaner (both dry paper and oil bath types)
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0019 Maintain safety and tidiness of remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain the safety and tidiness of remote area power supply (RAPS) systems.

It includes preparing to maintain safety and tidiness of RAPS system equipment, completing work and reporting issues.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERE0023 Work safely with remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain safety and tidiness of RAPS system	**1.1** Work health and safety (WHS)/ occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified and applied
	1.2 Risk control measures are applied in accordance with

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		workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Nature and location of the RAPS system is identified from work schedule and relevant person/s to determine the scope of work
	1.5	Advice on coordinating work with relevant personnel and the local community is obtained from relevant person/s and applied
	1.6	Tools and equipment required for cleaning work are obtained and checked for correct operation and safety
2 Maintain RAPS system	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3	Circuits/machines/system are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	RAPS system and area are cleaned in accordance with workplace procedures
	2.5	Cleaning is completed minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.6	Quality checks are conducted in accordance with workplace procedures
3 Complete work and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Cleaning and tidiness issues are reported to the local community in accordance with workplace procedures
	3.3	Cleaning work is completed and issues are reported to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

RAPS system must incorporate a battery bank and at least two of the following:	• generator set • photovoltaic (PV) array • RAPS system • wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK101A Maintain safety and tidiness of remote area power supply systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0019 Maintain safety and tidiness of remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- removing non-remote area power supply (RAPS) equipment
- safely removing insects, spiders and any animals
- safely removing dust and dirt from floors and equipment
- identifying and reporting at least two safety issues
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including:
  - applying relevant risk identification, assessment, reporting and control requirements
  - checking isolation of circuits/machines/system
- completing reporting requirements to relevant person/s and local community
- conducting quality checks
- coordinating work with relevant person/s and the local community
- determining live testing/measurement requirements
- maintaining safety and tidiness of RAPS system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS plant area cleaning, and maintaining RAPS systems, including:
  - need for a clean and tidy plant area
  - RAPS system components and associated equipment and their location within the plant area
  - manual fuel pump, if available
  - plant cleaning techniques:
    - fuel and oil

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    - acid spills
    - removal of dust, insects, spiders and animals
    - removal of non-RAPS equipment
- techniques for reporting and dealing with cleaning issues
- relevant safe work method statements (SWMS) or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies and procedures, including reporting requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining safety and tidiness of a RAPS system
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0020 Promote sustainable energy practices in the community

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to promote sustainable energy practices in the community.

It includes identifying and promoting sustainable energy practices to others in the community.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify sustainable energy practice	**1.1** Work activities are identified, planned and sequenced to ensure work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace policies and procedures are followed
	1.2 Relevant person/s is consulted to ensure work is coordinated with others

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	1.3	Materials are obtained and checked in accordance with workplace procedures and to comply with job requirements
	1.4	Work activities are determined from job requirements
	1.5	Materials necessary to complete work are obtained in accordance with workplace procedures and checked against job requirements
2 Promote sustainable energy practice	**2.1**	WHS/OHS policies and procedures for undertaking administrative functions are followed
	2.2	Work activities are performed in accordance with job requirements and workplace procedures without damaging the surrounding environment or services
	2.3	Unplanned events are responded to in accordance with workplace procedures and approval of authorised person/s
	2.4	Approval is obtained in accordance with established procedures from appropriate person/s before contingencies are implemented
	2.5	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the promotion of sustainable energy	**3.1**	Documentation/reports are completed to ensure promotional activity requirements are met
	3.2	Work completion is communicated to relevant person/s in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Promoting sustainable energy practices in the
- appliances

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community must include at least one of the following disciplines:	• business equipment • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy • security technology

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK114A Promote sustainable energy practices in the community.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0020 Promote sustainable energy practices in the community

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- applying sustainable energy practice in the community
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- checking work quality
- completing the promotion of sustainable energy
- determining location of work activities
- documenting promotional work activities after completion
- identifying and promoting sustainable energy practices
- obtaining and checking materials using sustainable energy practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- greenhouse reduction strategies, including:
  - greenhouse gas emissions profile encompassing:
    - goals and principles of the National Greenhouse Strategy (NGS)
    - what a greenhouse gas inventory is, why it is required, and the sectors to which it applies
    - uses to which the National Greenhouse Gas Inventory can be applied
  - climate change and its impacts encompassing:
    - the possible impact of climate change in Australia
    - techniques for improving the understanding of climate change
    - techniques for communicating to and educating the general public on greenhouse gas induced climate change

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- partnerships for greenhouse action encompassing:
  - actions achievable by each level of government to implement the NGS
  - methods by which the community activity can be engaged in the reduction of greenhouse gas emissions
  - initiatives that can be undertaken by the private sector to reduce greenhouse gas emissions
  - advantages of international partnerships
  - emissions trading system
- efficient and sustainable energy use and supply encompassing:
  - techniques for reducing the greenhouse intensity of energy supply
  - types of renewable energy (RE) sources suitable for use in Australia
  - methods and technique for improving end-use efficiency
- efficient transport and sustainable urban planning encompassing:
  - how integrating land use and transport planning can assist the greenhouse problem
  - how each of the following can be used to mitigate greenhouse gas; travel demand and traffic management strategies; encouraging greater use of public transport, walking and cycling; freight and logistics systems; improving vehicle fuel efficiency and fuel technologies
- greenhouse sinks and sustainable land management encompassing:
  - how enhancing greenhouse sinks and encouraging sustainable forestry and vegetation management can complement the AGS
  - how greenhouse gas emissions are obtained from agricultural production and describe techniques to mitigate the emissions
- models of greenhouse best practice in industrial processes and waste management encompassing:
  - types and methods of reducing greenhouse gas emissions from industry
  - methods of reducing methane emissions from waste treatment and disposal
- adaptation to climate change encompassing:
  - salient points in each of the key sectors that require analysis and the strategies required in the need for adaptation to climate change
- quality assessments
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant promotional materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0021 Provide basic sustainable energy solutions for energy reduction in residential premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide sustainable energy solutions for energy reduction in residential premises.

It includes preparing for and conducting monitoring of energy usage and providing solutions for energy reduction. It also includes completing monitoring activities and reporting.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to monitor energy usage and provide solutions for energy reduction	**1.1** Monitoring activities are planned and prepared in accordance with work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures and work is sequenced in accordance with requirements

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		1.2	Relevant person/s is consulted to ensure work is coordinated effectively with others
		1.3	Materials are obtained and checked in accordance with workplace procedures and job requirements
		1.4	Location of monitoring activities is determined from job requirements
2	**Undertake monitoring of energy usage and provide solutions for energy reduction**	**2.1**	WHS/OHS policies and procedures for monitoring activities are applied
		2.2	Monitoring activities are conducted in accordance with requirements without damage or distortion to the surrounding environment or services
		2.3	Sustainable energy options are determined from energy consumption monitoring activities, measurements and calculations
		2.4	Unplanned events or conditions are responded to in accordance with workplace procedures
		2.5	Approval is obtained from relevant person/s before any energy reduction solutions are implemented in accordance with workplace procedures
		2.6	Quality checks are conducted in accordance with workplace procedures
3	**Complete monitoring activities and report**	**3.1**	Documentation/reports are completed in accordance with administrative requirements
		3.2	Relevant person/s is notified of work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK112A Provide basic sustainable energy solutions for energy reduction in residential premises.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0021 Provide basic sustainable energy solutions for energy reduction in residential premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- providing basic sustainable energy solutions for energy reduction in domestic premises
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- completing relevant reporting
- conducting monitoring activities of energy usage
- completing quality checks
- coordinating work with relevant person/s
- identifying and accessing materials, tools, equipment and testing devices
- measuring and calculating energy consumption values in accordance with relevant industry standards
- preparing to monitor energy usage.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- concepts of renewable energy (RE), including:
  - non-technical issues encompassing:
    - current economic, social, environmental and political issues impacting on RE technology
  - energy services/demand encompassing:
    - terminology
    - energy, power, temperature, symbols and units
    - energy conversion and efficiency

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    - domestic dwelling: energy services and energy demand of individual appliances
    - energy efficient appliances
    - primary energy and end-use energy
    - embodied energy
- solar radiation resource encompassing:
    - terminology
    - units, symbols and conversions
    - sun path diagrams
    - solar contour maps
    - solar window
- solar thermal systems encompassing:
    - terminology
    - components
    - applications
    - types of hot water systems
- photovoltaic (PV) arrays encompassing:
    - terminology
    - current, voltage and power
    - modules: types, efficiency and applications
    - I-V curve
    - irradiance and temperature effects
    - array configurations
- wind energy resource and technology encompassing:
    - terminology, units and symbols
    - wind speed, direction, turbulence, wind and power
    - vertical wind speed profile (wind shear)
    - local terrain roughness
    - isovent maps
    - measuring instruments
    - wind energy conversion systems (WECS)
    - terminology
    - characteristics
    - applications
- micro-hydro resource and technology encompassing:
    - terminology, units and symbols
    - flow rate, head and assessment
    - turbine types and applications
- stand-alone power system configuration encompassing:
    - basic configuration series systems
    - components: functions, efficiencies, regulators, inverters, battery chargers and

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generators
- relevant industry standard energy consumption measurements and calculations
- sustainable energy solutions for energy reduction in residential premises
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to providing basic sustainable energy solutions for energy reduction in residential premises
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems with solar radiation, photovoltaic (PV) modules and the impact that tilt, location and orientation has on the output of a PV system.

It includes providing known solutions to predictable problems in photovoltaic energy modules and system operated at extra-low voltage (ELV) and low voltage (LV).

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltages above 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.). However, other conditions may apply in some states/territories subject to regulations related to electrical work.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Those holding an Unrestricted Electrician's Licence or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

Pre-requisite Unit

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

or

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

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Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on PV energy apparatus and systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are obtained and applied
	1.2 Hazards are identified, risks are assessed, and control measures and workplace procedures are implemented
	1.3 Nature of apparatus/modules problem/s are identified from relevant documentation or work supervisor to determine the scope of work to be undertaken
	1.4 Advice is sought from work supervisor to ensure the work is coordinated effectively with others
	1.5 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices needed for the work are obtained and checked for correct operation and safety in accordance with workplace procedures
2 Solve problems in PV energy apparatus and systems	**2.1** WHS/OHS risk control measures and workplace procedures are followed
	2.2 Need to inspect, test or measure live work is determined and conducted, as required in accordance with job requirements and workplace safety procedures
	2.3 Circuits are checked and isolated in accordance with WHS/OHS requirements and workplace procedures

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	2.4	Problem-solving techniques are used to solve PV energy modules problems using measured and calculated values of apparatus/modules operating parameters
	2.5	Problems are resolved without damage to apparatus/modules, circuits, the surrounding environment or services using sustainable energy practices
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS risk control measures and workplace procedures for work completion are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for solutions used to resolve PV energy modules problems is documented in accordance with workplace procedures
	3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems related to installation, fault finding, maintenance or development work functions must include at least three of the following types of PV energy problems and on at least two occasions:	• determining the operating parameters of an existing apparatus/modules • identifying and locating electrical faults • determining solar radiation faults and problems • identifying and locating mechanical fault

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK125A Solve basic problems in photovoltaic

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energy apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) procedures, including:
  - using risk control measures
  - checking tools, materials, equipment and testing devices for correct operation and safety
  - testing or measuring on live work and operating systems safely
  - ensuring circuits are isolated
- providing viable solutions to apparatus/modules problems, including:
  - using problem-solving techniques to solve photovoltaic (PV) energy apparatus/modules problems from measured and calculated values
  - determining the operating parameters of an existing PV energy apparatus/modules
  - dealing effectively with unplanned events in accordance with workplace procedures
  - documenting justification for the solution used
- using known solutions to predictable problems to solve apparatus/modules problems
- measuring solar irradiance with a solarimeter
- using field measurements and a sun path diagram, the times and dates when a PV array will be shaded by obstacles at a particular site
- calculation of:
  - the daily average irradiation on a horizontal plane given extra-terrestrial irradiation, location constants and sunshine hour data
  - the monthly mean daily irradiation falling on a PV array for each month of the year, adjusted for the effects of shading, using irradiance and irradiation data tables and a sun path diagram and/or appropriate software
  - the power at maximum power point (MPP), and the power under typical battery charging conditions of a PV module, given irradiance and ambient air temperature
  - the daily energy output of a PV array in accordance with relevant industry standards, and by using "rule of thumb" de-rating factors
  - selection of an appropriate tilt angle for fixed and seasonally adjustable PV arrays at a given latitude.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, policies, procedures and standards
- risk mitigation processes
- daily irradiation, including:
  - definition of the terms: declination angle, reflectance, sunshine hours, extra-terrestrial irradiation, latitude, direct and diffuse radiation, azimuth and altitude angles, radiance, solar window, tilt angle, solstice and equinox
  - units and symbols for irradiation and irradiance
  - interpretation of solar radiation data tables and contour maps
  - how radiation varies throughout the year on the surface of a fixed collector
  - factors affecting the optimal tilt and orientation of PV arrays
- PV modules, including:
  - definition of the terms: cell, module, array, mono-crystalline, poly-crystalline, amorphous, band gap energy and semi-conductor
  - diagram of a basic crystalline silicon PV cell, showing its physical structure, with at least five major features labelled
  - major steps in the production of PV modules based on bulk silicon cells in comparison with the production of thin film PV modules
  - basic physical principles of PV cell operation for the main types of commercially available PV modules
  - efficiency, spectral response, cost and typical applications of the main types of commercially available PV modules
  - new PV technologies currently being developed towards commercialisation, and their major features
  - mechanical and electrical features necessary for the long life of a PV module under a wide range of operating conditions
- module characteristics including:
  - definition of the terms: I-V curve, fill factor, operating point, MPP, cell temperature co-efficient, nominal operating cell temperature (NOCT), current, voltage and power output co-efficient
  - equivalent circuit for a PV cell, labelling each of the elements and the polarity of the terminals
  - family of current - voltage (I-V) curves for a PV module, labelling major points and showing the effects of variation in irradiance and variation in cell temperature
  - major ratings of a PV module from manufacturer’s information or nameplate data
  - determination of the operating point of a PV module with a resistive load, a constant voltage source or any other load with known I-V characteristics, using the load line

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method

- configuration of a typical PV array, including the function, placement and ratings of blocking and bypass diodes
- the effect of partial shading of a PV module or array, the impact of bypass diodes and the significance of their configuration on output current in typical operating conditions
- the scope and content of Australian or international standards relevant to the performance of PV modules
- the electrical characteristics of a PV module according to relevant Australian or international standards, using an outdoor test method.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0023 Work safely with remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to work safely on remote area power supply (RAPS) systems.

It includes preparing to enter a RAPS system, applying safe working practices, and following workplace procedures for hazard identification and risk control in RAPS system areas.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to enter a RAPS system	**1.1** Hazards/risk control procedures for RAPS systems maintenance are identified and applied
	1.2 System access permit is obtained from relevant person/s
	1.3 Preparation for electrical and non-electrical isolation is completed in accordance with workplace procedures

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	1.4	Tools and equipment required for work are checked for safety and correct functionality in accordance with workplace procedures
2 Apply safe working practices in RAPS system area	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Safe work practices for RAPS system are applied in accordance with workplace procedures
	2.3	Circuits/machines/system are isolated in accordance with work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures
	2.4	Safe work practices in RAPS system are applied in accordance with workplace procedures
	2.5	Safe working practices are applied minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.6	Quality checks are conducted in accordance with workplace procedures
3 Follow workplace procedures for hazard identification and risk control in RAPS system areas	**3.1**	Risks/hazards are identified, assessed and control measures implemented and monitored through consultation with relevant person/s and the local community
	3.2	Workplace hazards are identified and reported to relevant person/s in accordance with workplace procedures
	3.3	WHS/OHS incident reports are completed in accordance with regulatory requirements and workplace procedures
	3.4	Instructions and training are applied in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Working safely with RAPS system must include at least the following:	• two different systems incorporating the following:
	  • battery bank
	  • generator set
	  • photovoltaic (PV) array
	  • one RAPS system with the addition of a wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK102A Work safely with remote area power supply systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0023 Work safely with remote area power supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- preparing to enter the remote area power supply (RAPS) system including, permission to enter the area and to isolate RAPS equipment
- applying work procedures and instructions as they apply to risk control measures
- dealing with accidents and emergencies
- participating in consultation processes, identifying hazards and implementing and monitoring control measures
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices in RAPS system, including:
  - completing WHS/OHS incident reports
- conducting RAPS system quality checks
- obtaining and inspecting tools and equipment and reporting faults
- preparing for and checking isolation of circuits/machines/systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS safe working practices, including:
  - general safety encompassing:
    - general safety
    - risk assessment
    - personal protective equipment (PPE)
    - WHS/OHS procedures
  - RAPS safety and risk assessment encompassing:
    - types of hazards in and around RAPS:

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        - rotating machines
        - fuels and oils
        - exhaust fumes
        - acids and flammable gases from batteries
    - measures for dealing with hazards in and around RAPS
    - purpose and methods for isolation and de-energisation of power supplies
- correct isolation and de-energisation procedures encompassing:
    - processes for preventing generator from automatically starting
    - isolating photovoltaic (PV) arrays
    - isolating wind driven generators
    - isolating battery
    - isolating inverter power sources
- safety signage encompassing:
    - types of signs
    - location
    - condition
    - suitability
- access to system encompassing:
    - methods for limiting access to plant areas
- reporting
- access to RAPS, including:
    - obtaining access permit/s
- relevant manufacturer specifications
- relevant workplace documentation, policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0024 Attend to breakdowns in remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to attend to breakdowns of remote area power supplies (RAPS).

It includes preparing for, conducting, completing and reporting on maintenance of RAPS.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEERE0019 Maintain safety and tidiness of remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to undertake maintenance work	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for relevant work area are identified and applied in accordance with workplace

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		procedures
	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Nature of maintenance work is identified from documentation or from relevant person/s to determine the scope of work
	1.5	Advice on coordinating work with others is obtained from relevant person/s and applied
	1.6	Materials required for the work are identified and accessed in accordance with workplace procedures
	1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Conduct maintenance work	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.5	Work is conducted minimising waste of materials and energy, damage to apparatus, circuits, the surrounding environment and services
	2.6	Quality checks are conducted in accordance with workplace procedures
3 Complete work and report outcomes	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Relevant person/s is notified of the completion of maintenance in accordance with workplace procedures

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and documented

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK109A Attend to breakdowns in remote area power supplies (RAPS).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0024 Attend to breakdowns in remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- working safely
- ascertaining the nature of a breakdown
- ascertaining the extent of repairs required and the personnel needed to repair the breakdown
- reporting so arrangements can be made for the repair work to be carried out
- undertaking specified minor repairs
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- attending to breakdowns in remote area power supplies (RAPS)
- checking isolation of circuits/machines/systems
- completing relevant reporting
- conducting quality checks
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- remote area essential services facilities breakdowns, including:
  - remote area essential services facilities repairs encompassing:
    - windows
    - fences
    - gate
    - locks and catches
  - power generation components repairs encompassing:

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    - diesel engines
    - generators
    - batteries
    - photovoltaic (PV) arrays
    - wind generators
    - auxiliary equipment
  - electrical lighting services minor repair encompassing:
    - incandescent light globes
    - fluorescent tubes
    - fluorescent light starters
    - diffusion devices
    - safety awareness
  - essential services facilities safety and security and emergency checks encompassing:
    - broken windows
    - faulty lighting
    - damaged gates
    - logging the inspections
    - notification of the situation
    - safety awareness
  - telephone encompassing:
    - answer calls promptly and clearly
    - using designated business protocol procedures
    - making and receiving telephone calls in a workplace-related context
    - obtain accurate telephone numbers from an appropriate source
    - establish contact using designated business protocol
    - procedures
    - convey purpose of call clearly and concisely
  - electrical encompassing:
    - identification and basic function of electrical components used
    - for generating and distributing
    - electricity safety procedures when working with electricity
    - identification of faulty electrical components
    - reporting of faulty electrical components
- electrical work
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to attending to breakdowns in RAPS
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0025 Carry out basic repairs to renewable energy (RE) apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to carry out repairs to renewable energy (RE) apparatus.

It includes preparing to repair RE apparatus, repairing RE apparatus, completing and reporting on repair activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

Pre-requisite Unit

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

and

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

or

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair RE apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of repair is obtained from documentation or relevant person/s to determine the scope of work
	1.4 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.5 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.6 Tools, apparatus and testing devices required for work are obtained and checked for correct operation and safety
2 Repair RE apparatus	**2.1** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.2 Circuits/apparatus are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 Apparatus is dismantled in accordance with manufacturer guides and instructions from relevant person/s
	2.4 Component parts are tagged during dismantling to ensure correct and efficient reassembly and stored to protect against loss or damage
	2.5 Apparatus is assembled in required sequence with all parts placed, secured and connected in accordance with manufacturer guides or industry practice
	2.6 Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures

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	2.7	Repairs are completed minimising waste of materials, damage to apparatus, the surrounding environment and services applying sustainable energy practices
3 Complete and report repair work activities	**3.1**	Repaired apparatus is prepared for testing by relevant person/s
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Relevant person/s is notified of repair work completion in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Repairs must include the following:	• RE apparatus limited to replacement or repair of components in which the fault has been previously determined
Carrying out repairs to RE apparatus must include the following:	• two different RE apparatus in which three different types of components are faulty, one of which is mechanical

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK123A Carry out basic repairs to renewable energy apparatus.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0025 Carry out basic repairs to renewable energy (RE) apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- following manufacturer service instructions for access to components
- removing at least three different types of components specified in the work instructions
- replacing components to manufacturer requirements
- reassembling the apparatus correctly
- testing apparatus operation
- dealing with unplanned events
- applying relevant risk identification, assessment, reporting and control requirements
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- carrying out repairs to renewable energy (RE) apparatus, including:
  - completing and reporting on repair work
  - determining scope of repair work
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RE technologies, including:
  - major non-technical issues encompassing:
    - impact of economic, social, environmental and political issues on the use of RE technologies
    - how each of the non-technical issues impact on the application of a selected RE

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technology

- energy services and demand encompassing:
  - definition of the terms: energy, power, energy efficiency, end-use energy, primary energy and embodied energy
  - calculation relating to energy, power and time with the appropriate number and time with the appropriate number of significant figures
  - units and symbols for energy, power, time and temperature using standard International System of Units (SI) and prefixes
  - conversion of energy and power quantities from one unit to another using conversion tables
  - the two laws that apply to any energy conversion process
  - efficiency of a simple energy conversion process
  - energy services required by a domestic dwelling
  - power and energy consumption of individual appliances and systems using appropriate meters or other methods
  - calculation of the end use and primary energy required for these energy services
  - selection of the most appropriate energy source for each of these services
  - justification in terms of environmental, economic, social and political constraints
  - selection of appropriate energy efficient appliances and technologies
- solar resource encompassing:
  - definition of the terms: irradiation, latitude, solar constant, direct and diffuse radiation, azimuth and altitude angles, irradiance, solar window, tilt angle, solstice and equinox
  - units and symbols for irradiation and irradiance and the conversion of one unit to another using conversion tables
  - measurement of solar irradiance with a solarimeter
  - solar radiation data tables and contour maps
  - position of the sun for a given date, time and latitude using a sun path diagram
  - times when an obstacle will shade a given collector
  - how radiation varies throughout the year on the surface of a collector which is either fixed, single-axis tracking or double-axis tracking
  - appropriate tilt angles for fixed and seasonally-adjustable collectors at a given latitude and given application
  - calculation of the effect of single-axis tracking and double-axis tracking on collected radiation using radiation data tables
- solar thermal systems encompassing:
  - definition of terms: conduction, convection, radiation, collector heat loss co-efficient, conductivity, specific heat and solar fraction
  - components for a solar thermal system, including collector, storage, reticulation and control
  - solar collector types suitable for low, medium and high temperature applications
  - different types of domestic solar hot water (SHW) systems
  - how the components of thermosiphon and pumped storage systems operate

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  - heat loss mechanisms in collectors
  - stratification in storage tanks
  - backup energy systems
  - control and protection strategies
  - solar fraction of a domestic SHW system with the use of table or nomograms
- energy efficient building design encompassing:
  - definition of terms: thermal comfort, passive system, active system, aspect of the site, orientation of the building and thermal mass
  - the climate factors which affect building design
  - relationship between thermal comfort and climate
  - relationship between the seasonal variation of the sun's path and the heat gain of the building elements (roof, walls, windows and floor)
  - effect of the thermal conductivity of building materials on heat flows to and from the building
  - use of thermal mass in reducing temperature variations within the building
  - use of ventilation
  - thermal performance of a dwelling using both indoor and outdoor hourly temperature measurements over the period of at least one day
  - effect of insulation, glazing, orientation, shading devices, thermal mass and ventilation on the thermal performance of a building
  - an active solar system which could be used in a dwelling to complement passive design features in extreme climates
  - aspects of an existing dwelling that contribute to or detract from thermal performance
- photovoltaic (PV) arrays encompassing:
  - definition of terms: PV cell, module, series, parallel, array, maximum power point (MPP), nominal operating cell temperature (NOCT), short circuit current (ISC), open circuit voltage (VOC), I-V curve, current at maximum power point (IMP) and voltage at maximum power point (VMP)
  - calculations relating to voltage, current and power with the appropriate number of significant figures and using standard SI units and prefixes
  - types of commercially available PV modules, their efficiency and typical applications
  - I-V curve for a typical PV module and label the approximate position of MPP and values of ISC, VOC, IMP and VMP
  - effect of irradiance and temperature on ISC, VOC, IMP and VMP
  - function of blocking and bypass diodes
  - current and voltage of a single module to produce the I-V characteristic curve
  - major specification criteria for a PV module
  - size and configuration of a PV array for a given load and system voltage using tables or nomograms
- wind energy resources encompassing:
  - definition of terms: kinetic energy, specific wind power, vertical wind speed profile, surface roughness, temperature inversion layer, cut in (vC), rated (vR) and furling

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(vF) wind

- speeds, rated power (PR), power co-efficient (cP), output co-efficient (cO and tip speed ratio
  - units and symbols for wind speed, specific wind power and air density
  - large scale wind patterns over the Australian continent, their causes and the effect of local terrain on wind speed, direction and turbulence
  - specific wind power for given wind speeds
  - wind speed at different heights above ground level
  - the mean wind speed based on wind speed frequency distribution data in the form of a histogram
  - suitable minimum tower height for a wind energy conversion system (WECS) sited downwind from an obstacle
  - isovent maps
  - types of wind-measuring instruments and the minimum requirements for assessing wind energy at a given site
  - measurement of wind speed and direction
  - characteristics of horizontal axis and vertical axis, upwind and downwind, lift and drag propelled wind turbines
  - power vs. wind speed curve for a typical WECS showing vC, vR, vF, and PR
  - major specification criteria for a WECS
  - sizing a WECS for a given load, efficiency and annual mean wind speed using tables or a nomogram
- micro-hydro system basis encompassing:
  - definition of terms: flow rate, gross or static head, potential energy, net or dynamic head, hydraulic efficiency, micro-hydro system efficiency, equivalent pipe length, reaction turbine and impulse turbine
  - units and symbols for flow rate, head and gravitational constant
  - methods each assessing flow rate and head
  - measurement of stream flow rate and head
  - assessment from contour maps
  - different micro-hydro systems in terms of their physical and operating characteristics
  - major specification criteria for a micro-hydro system for electricity generation
  - suitable type and size of micro-hydro-system for a given load, efficiency, available flow rate and net head using tables or a nomogram
- energy storage encompassing:
  - methods of energy storage
  - energy density of the energy storage methods above by mass and volume
  - definition of the following terms in relation to batteries: nominal voltage, cell, primary and secondary cells, battery, charge and discharge rate, amp hour capacity, watt hour capacity, state of charge (SOC), depth of discharge (DOD), specific gravity (SG), watt hour and amp hour efficiency, and cycle life
  - major features of common types of batteries suitable for stand-alone power systems

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    - state of charge of a lead-acid battery through measurement of specific gravity or battery voltage using safe working practices
- stand-alone power system basis encompassing:
    - direct current (d.c.) sub-system efficiency
    - block diagram of a typical stand-alone power system
    - function of each stand-alone power system component
    - typical efficiencies of each component
    - major characteristics of different types of commercially available regulators, inverters and battery chargers
- biomass encompassing:
    - definition of terms: biogas, producer gas, biofuels, feedstock, gross and net calorific values
    - biofuels and their specific energy contents
    - method of production of one of these five biofuels, including source of raw material/feedstock, conversion process and yield
    - applications for each of the biofuels
    - assessment of the biomass resource required to meet a particular energy service, e.g. cooking, hot water, space heat, transport, process heat and electricity
    - social, political and economic impact of large-scale use of selected biomass resources
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry

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- resources that reflect current industry practices in relation to carrying out repairs to RE apparatus by replacement of components
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0026 Conduct checks in the demand side use of remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct checks in the demand side use of remote area power supply (RAPS) use.

It includes preparing for, completing and reporting on checking of community RAPS use.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERE0023 Work safely with remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to check RAPS system use	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a RAPS system are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with

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			workplace procedures prior to commencing work
		1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
		1.4	Nature and location of RAPS system is identified from relevant documentation or from relevant person/s to determine the scope of work
		1.5	Instructions for coordinating work with relevant personnel and the local community are obtained from relevant person/s and applied
		1.6	Materials required for the work are identified and accessed in accordance with workplace procedures
		1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	**Check use of RAPS system**	**2.1**	Workplace risk control measures and procedures are applied
		2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
		2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4	RAPS system testing and checks are conducted in accordance with relevant workplace procedures
		2.5	Retrieval of performance data is completed safely and in accordance with workplace procedures
		2.6	Known types of functional faults are identified using fault-finding procedures
		2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
		2.8	Checking is conducted minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
		2.9	Quality checks are conducted in accordance with workplace procedures
3	**Complete check of RAPS**	**3.1**	Workplace risk control measures and procedures are

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system and report outcomes	applied
	3.2 Worksite is cleaned and made safe in accordance with workplace procedures
	3.3 Issues identified during checking are referred to the local community in accordance with workplace procedures
	3.4 Check results are reported to relevant person/s in accordance with check reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Conducting checks in the demand side use of RAPS must include at least the following:	• two different systems where the battery bank is charged from:
	  • a generator set
	  • a wind generator

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK107A Conduct checks in the demand side use of remote area power supplies (RAPS).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0026 Conduct checks in the demand side use of remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- retrieving of performance data
- identifying demand use issues
- reporting all check activities
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- completing remote area power supply (RAPS) use reporting
- conducting checks of use of RAPS
- coordinating work with relevant personnel and the local community
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining live electrical work testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RAPS system use auditing techniques, including:
  - general safety
  - demand side use of power systems encompassing:
    - demand exceeds supply
    - size or capacity of the system
    - energy needs of the end users
    - energy use awareness of the end users

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    - data logging chips
  - demand versus supply encompassing:
    - selecting appliances
    - using appliances
    - using lights, hot water and freezers
    - energy efficient items
    - compact fluorescent lamp (CFL) globes
    - water saver shower heads
    - weather stripping
    - appropriate use of RAPS system components - overloading system components, using generator supply for heavy loads
- reporting
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to conducting checks in the demand side use of RAPS
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0027 Coordinate maintenance of renewable energy (RE) apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to coordinate maintenance of renewable energy (RE) apparatus and systems.

It includes preparing for, conducting and completing coordination of maintenance work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0042 Solve problems in ELV single path circuits

UEERE0019 Maintain safety and tidiness of remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to coordinate maintenance	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for relevant work area are identified and applied in accordance with workplace

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		procedures
	1.2	Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Scope of work is determined from job specifications, drawings and regulatory requirements
	1.5	Relevant person/s is consulted to ensure work is coordinated effectively with others at the worksite
	1.6	Competencies required to conduct work are determined from job specifications and/or consultations with appropriate person/s
	1.7	Personnel and materials required for maintenance are obtained in accordance with workplace procedures and checked against job requirements
	1.8	Tools, equipment and testing devices required for maintenance are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9	Preparatory work is checked to ensure no damage has occurred and it complies with requirements
2 Conduct maintenance work	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Maintenance is conducted in compliance with technical standards, job specifications and requirements
	2.5	Strategies to deal with unexpected situations are determined from discussions with relevant person/s, job specifications and requirements
	2.6	Methods to deal with unexpected situations are selected based on safety requirements, specified work outcomes and workplace procedures

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	2.7	Maintenance quality checks are conducted in accordance with job specifications, technical standards, regulatory requirements and/or workplace procedures
	2.8	Work is conducted minimising waste of materials and energy, damage to apparatus, circuits, the surrounding environment and services
3 Complete work	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is made safe in accordance with workplace safety procedures
	3.3	Maintenance conforming with requirements is verified
	3.4	Completion of work is documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK110A Co-ordinate maintenance of renewable energy (RE) apparatus and systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0027 Coordinate maintenance of renewable energy (RE) apparatus and systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- interpreting maintenance schedule requirements correctly
- accessing appropriate plant, materials and personnel
- following a maintenance schedule
- evaluating apparatus for compliance with specified requirements
- arranging for corrective action of non-compliant apparatus
- documenting maintenance work
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- coordinating maintenance of renewable energy (RE) apparatus and systems
- checking isolation of circuits/machines/systems
- completing relevant reporting/documentation
- conducting quality checks
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- determining scope of work.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- scheduled maintenance process, including:
  - maintenance principles encompassing:
    - maintenance function
    - role of maintenance department
    - WHS/OHS requirements
  - maintenance systems encompassing:

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    - maintenance terminology
    - preventative maintenance
    - predictive maintenance
    - corrective maintenance
  - data acquisition encompassing:
    - plant history cards/files
    - inspection techniques
    - predictive maintenance
    - remote visual inspection
    - non-destructive testing
    - thermography
    - vibration analysis
    - oil analysis
  - maintenance plan encompassing:
    - characteristics of plant operation
    - assessment of failure characteristics
    - link failure characteristics to maintenance systems
    - identify production windows
    - resources
    - labour
    - materials
    - establish plan
    - implementation procedures
  - review of maintenance plan encompassing:
    - analysis of records
    - manual recording methods
  - computerised recording methods
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to coordinating maintenance of RE apparatus and systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0028 Design hybrid renewable power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design a hybrid renewable power system and its installation.

It includes determining and developing hybrid power systems design, following design briefs, documenting design calculations and criteria, and obtaining approval for hybrid renewable power system design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0046 Solve problems in stand-alone renewable energy systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design hybrid renewable power system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the system is determined from design brief

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	1.3	Safety and other regulatory requirements to which the renewable power system installation must comply are identified and applied
	1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved in the hybrid power system installation or associated work
2 Develop hybrid renewable power system design	**2.1**	Hybrid renewable power system performance standards and compliance methods are applied to the design
	2.2	Alternative hybrid renewable power system designs are considered in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the hybrid renewable power system design
	2.4	Hybrid renewable power system design is drafted and checked for compliance with the design brief and regulatory requirements
	2.5	Hybrid renewable power system design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with safely and effectively in accordance with workplace procedures
3 Obtain design approval for hybrid renewable power system	**3.1**	Hybrid renewable power system design is presented for approval and any issues clarified with client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s within the constraints of workplace policies
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with relevant performance agreement and/or workplace procedures or industry standards

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing hybrid renewable power systems must include at least the following:	• two different hybrid renewable power system designs using different technologies

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK133A Design hybrid renewable power systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0028 Design hybrid renewable power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices when designing hybrid renewable power system
- designing hybrid renewable power system
- preparing to design hybrid power system in accordance with design brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hybrid energy systems, including:
  - energy demand encompassing:
    - end-use services and energy demand for each service
    - most appropriate energy sources for each energy service for a given application and location, taking into consideration economic, environmental and client requirements
    - greenhouse gas savings from a hybrid energy system compared to an existing non-hybrid system, resulting from energy source switching and reduction in fuel usage
    - daily load profiles illustrating average demand and maximum demand, based on time

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of use data for all electrical loads
    - daily load profiles based on given load data, with consideration of likely variations in usage patterns
    - load management strategies and or energy source switching options to reduce the maximum and surge demand, based on load profile analysis
    - load profile using alternating current (a.c.) power logging equipment
    - daily load profiles illustrating average demand and maximum demand, based on time of use data for all electrical loads
- hybrid energy system operation encompassing:
    - definition of the terms complementarily (in relation to renewable energy (RE) resources)
    - availability
    - advantages and disadvantages of hybrid energy systems
    - major features of typical system configurations, including pure renewables, renewables and genset, series, switched and parallel (including those with nominal daily genset running)
    - operation of a hybrid system over the short term (e.g. daily) and long term (e.g. seasonal and annual)
    - response of a genset to a step change in load, and to an overload condition
    - calculations relating to real and apparent power, power factor, mechanical power, voltage regulation and speed droop for single and three phase gensets
    - calculation of the average efficiency of a genset supplying a given daily load profile, given genset efficiency vs. load data
- system design encompassing:
    - system design criteria in consultation with a client
    - RE resources available at a site through the use of on-site measurements and pre-existing weather data as appropriate
    - selection of a suitable hybrid power system configuration
    - selection and sizing of suitable RE generators for a hybrid energy system taking into consideration available RE resources and daily and seasonal load profiles consistent with AS/NZS 4509.2 Stand-alone power systems – System design
    - analysis of load data to determine preferred time of day for genset running, and required energy storage in a parallel hybrid system
    - selection and sizing of a suitable genset for any system configuration, including a parallel system, according to AS/NZS 4509.2 Stand-alone power systems – System design
    - selection and sizing of suitable balance-of-system components for a hybrid energy system, including energy storage, controls and inverters consistent with AS/NZS 4509.2 Stand-alone power systems – System design
    - selection and sizing of a battery bank to meet both energy and maximum power demands in a parallel hybrid system, using an appropriate battery discharge rate and considering load data and genset running times
    - selection of an inverter for a parallel hybrid system, considering load data, genset

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running times and battery charging requirement
    - selection and sizing of suitable internal combustion generators (genset) for a hybrid energy system taking into consideration genset characteristics and de-rating requirements
    - performance of the system given load data, resource data, equipment specifications, configuration and control strategy
    - calculation of the load fraction contributed from each renewable energy generator and from the genset
    - calculation of the genset run time and fuel usage
    - optimisation of the system design based on a mix of design criteria such as cost, availability and reliability, maintenance, environmental factors and convenience
    - system manual according to AS/NZS 4509.3 Stand-alone power systems – Installation and maintenance and AS/NZS 4509.2 Stand-alone power systems – System design, given system components and design data
- life cycle costing encompassing:
    - present worth of a future payment
    - major costs in the life cycle of a hybrid energy system to be considered in life cycle costing
    - selection of an appropriate discount rate, inflation rates, and life cycle for a hybrid system life cycle cost analysis
    - life cycle cost analysis, including the cost of finance and tax savings for a hybrid system using computer software
    - most cost-effective of a number of hybrid energy system options on the basis of life cycle costing analysis according to AS/NZS 4536 Life cycle costing, AS 3595 or similar standards
    - comparison of the capital cost, simple payback time and life cycle cost of a hybrid energy system with another energy supply option, according to AS/NZS 4536 Life cycle costing, AS 3595 or similar standards
    - sensitivity analysis of life cycle costing to variations in discount rate or other major parameters
- installation, commissioning and maintenance encompassing:
    - specification of the installation and maintenance requirements for a complete hybrid energy system taking into consideration safety and relevant Australian Standards
    - installation requirements for fuel storage for a given genset in accordance with AS 1940 The storage and handling of flammable and combustible liquids, AS/NZS 4509 Stand-alone power systems, and local regulations
    - considerations involved in providing adequate genset vibration isolation
    - considerations involved in providing a genset exhaust system suitable for a given genset and installation site
    - major considerations and methods used in providing suitable noise attenuation for a genset installation
    - specification of the physical accommodation requirements for a given genset to provide adequate air flow and noise attenuation, with due regard for safety, maintenance access, and in accordance with AS/NZS 3010 Electrical installations and

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AS/NZS 4509 Stand-alone power systems

- methods used to allow extended service intervals for gensets
- main features of engine protection systems commonly used on small gensets and the genset sizes to which these are applicable
- installation and commissioning work on a small genset and controller observing relevant WHS/OHS guidelines
- symptoms of common genset faults
- basic fault location and rectification on a genset with the aid of troubleshooting guides or flowcharts
- symptoms, causes and possible solutions for the phenomenon of hunting
- maintenance schedule for a hybrid power system

- data communications encompassing:
  - typical applications of data communications in RE systems
  - different types of cables and connectors used in data communications between electronic devices and computers
  - commonly used protocols used for serial data communications
  - different communications ports on palmtop, laptop or desktop computers
  - correction of an electronic device (e.g. inverter or charge controller) to a computer directly, and via modems and telephony network, using appropriate cabling, connectors and computer ports
  - dial-up connection from a computer to a remote electronic device, such as an interactive inverter
  - standard terminal program or proprietary communications software to send to and receive data from an electronic device
  - programming and retrieving data from an interactive inverter via a computer and data communications link
  - logged data downloaded from an interactive inverter
- data-logging encompassing:
  - general features and operation of on-site and remote data logging systems for monitoring and control of a hybrid energy system
  - logger programming, data downloading, display and interpretation of the results
- interactive inverters encompassing:
  - main features of different devices commonly used as controllers in hybrid energy systems
  - function and operation of an interactive inverter
  - system control philosophies used in different interactive inverters
  - program parameters for an interactive inverter, as required for the correct operation of a parallel hybrid system given system component details, load data and preferred genset running times
  - appropriate charging regime for the system battery, based on manufacturer’s data and system operating conditions
  - programming an interactive inverter through its front panel interface

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    - function, operation and major features of a genset controller and how it interfaces with a system controller such as an interactive inverter
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing hybrid renewable power systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0029 Design micro-hydro systems rated to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design micro-hydro systems rated to 6.4 kilowatt (kW) and its installation.

It includes determining and developing micro-hydro system design, following design briefs, documenting design calculations and criteria, and obtaining design approval for micro-hydro system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0045 Solve basic problems in micro-hydro systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design micro-hydro system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the micro-hydro system electrical installation is determined from design brief

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	1.3	Safety and regulatory requirements to which the electrical installation must comply are identified, obtained and applied
	1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved in the micro-hydro system installation or associated work
2 Develop micro-hydro system design	**2.1**	Micro-hydro system performance standards and compliance methods are applied to the design
	2.2	Alternative micro-hybrid power system designs are considered in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the micro-hydro system design
	2.4	Micro-hydro system design is drafted and checked for compliance with the design brief and regulatory requirements
	2.5	Micro-hydro system design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with safely and effectively in accordance with workplace procedures
3 Obtain design approval for micro-hydro system	**3.1**	Micro-hydro system design is presented for approval and any issues clarified with client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s within the constraints of workplace policies
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with relevant performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing micro-hydro systems rated to 6.4 kW must include at least the following:

- two micro-hydro system designs each using different technologies

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK138A Design micro-hydro systems rated to 6.4 kW.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0029 Design micro-hydro systems rated to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and includes:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements. including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices when designing micro-hydro systems rated to 6.4 kilowatt (kW)
- designing micro-hydro system rated to 6.4 kW
- preparing to design micro-hydro system in accordance with design brief.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- micro-hydro systems design
- site evaluation encompassing:
  - definition of the terms: potential and kinetic energy, micro-hydro system, gross head, net head and flow rate
  - available head at a site using a dumpy level or theodolite, altimeter, pressure gauge and contour maps
  - the accuracy, advantages and disadvantages of each method for flow and head assessment

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    - the flow rate of a given site using each of the following methods - catchment area calculations, water diversion to fill a container, stream velocity/area measurement and/or weir construction method
    - advantages and disadvantages of each method of head and flow measurement with particular reference to their accuracy
    - long-term usable flow rate from long-term stream flow, if available, taking into account environmental considerations
    - effects of seasonal variation using long-term weather data
    - typical daily and seasonal energy consumption profile at a given site
    - effect of the energy demand profiles both daily and seasonally at the site on the system sizing
    - government regulatory requirements such as those covered under environmental or water resource legislation
    - environmental constraints at a site, including minimum stream flow rates, ecological impacts, visual and noise impacts
- system design encompassing:
    - suitable micro-hydro system characteristics to suit site load, hydraulic head and stream flow rate characteristics and a suitable type of commercially available micro-hydro system to suit
    - frictional losses in delivery pipes using manufacturer's data
    - calculation of the energy output of the selected micro-hydro system at the site from water flow rate, head and manufacturer’s data, allowing for seasonal variations in performance and environmental constraints
    - design of any required weirs or dams, open races or penstocks, strainer and intake systems
    - optimum position of the micro-hydro system and size of the micro-hydro system
    - suitable balance of system components, including delivery pipe and fittings, transmission cable and voltage, voltage and frequency regulation, battery storage type and capacity, battery charger, inverter, back-up generator and load dump
    - likely environmental impacts of the micro-hydro system and appropriate measures to minimise these impacts
- system costing encompassing:
    - major costs to be considered in the life cycle costing method
    - calculation of the capital and life cycle cost that includes the cost of various system configurations for a micro-hydro application
    - external costs that might impact on the cost-effectiveness of a micro-hydro system
    - most cost-effective of a number of options on the basis of life cycle costing analysis
- micro-hydro systems installation and maintenance processes encompassing
    - selection of an appropriate micro-hydro system taking into account the topology of the site, local council approvals, environmental considerations, site access and transport of equipment, water and power transmission distances, and daily and seasonal load profiles
    - appropriate methods, using appropriate safety procedures, for dam or weir

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construction, watercourse construction and/or penstock installation, and turbine installation
    - appropriate installation, commissioning, fault diagnosis and rectification procedures and maintenance methods using appropriate safety procedures
    - maintenance schedule for the system
    - schematic and wiring diagrams for the micro-hydro system showing the general circuit layout and protection between the micro-hydro system, batteries, inverter and loads according to AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems, and AS 4086.2 Secondary batteries for use with stand-alone power systems - Installation and maintenance requirements
    - safety procedures for the installation, commissioning, fault diagnosis and maintenance of system components, seasonal variations in performance and environmental constraints
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing micro-hydro systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0030 Design renewable energy (RE) heating systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design a renewable energy (RE) heating system and its installation.

It includes determining and developing RE heating systems design, following design brief, documenting design calculations and criteria and obtaining approval for system design.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0046 Solve problems in stand-alone renewable energy systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design RE heating system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the electrical installation for RE heating system is determined from design brief

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	1.3	Safety and other regulatory requirements to which the electrical installation must comply are determined and applied
	1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved in the RE heating system installation or associated work
2 Develop RE heating system design	**2.1**	RE heating system performance standards and compliance methods are applied to the design
	2.2	Alternative heating system design/s is considered in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the RE heating system design
	2.4	RE heating system design is drafted and checked for compliance with the design brief and regulatory requirements
	2.5	RE heating system design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with safely and effectively in accordance with workplace procedures
3 Obtain design approval for RE heating system	**3.1**	RE heating system design is presented and any issues clarified to client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s within the constraints of workplace policies
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with relevant performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK129A Design renewable energy (RE) heating systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0030 Design renewable energy (RE) heating systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices when designing renewable energy (RE) heating system
- preparing to design RE heating system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- design of RE heating, including:
  - heat transfer encompassing:
    - modes of heat transfer
    - conduction through a flat plate, series flat plates, thick and thin wall pipe, and composite pipes (e.g. lagged pipes and drums)
    - convection at a flat surface or tube
    - radiation from a flat surface or tube for black or grey bodies
    - combined conduction and convection through single or multiple flat plates or thin wall tubes
    - combined convection and radiation

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- combined conduction, convection and radiation such as fluid in a tank (convection to wall), through wall and/or insulation (conduction) to outside air (convection and radiation)
- heat exchangers - parallel, counter flow and cross flow

- combustion and fuels encompassing:
  - the combustion process
  - fuels - desirable and undesirable characteristics, solid, liquid and gaseous types, their relative advantages and disadvantages and common methods of combustion
  - air/fuel ration - stoichiometric excess or insufficient air
  - emissions and pollutants and their control
  - combustion equations - element mass balance
  - combustion products - gravimetric basis
- steam encompassing:
  - importance of steam for heat transfer and power production
  - steam/water properties and the interrelationship between the various properties for unsaturated or saturated water or steam either superheated, saturated or wet
  - saturation temperature and pressure, specific enthalpy, specific volume and dryness fraction
  - temperature-specific enthalpy diagram for steam/water
  - use of steam table to determine steam/water properties (any condition except supercritical)
  - steam generation - water tube and fire tube boilers, and boiler efficiency
  - safety devices and controls used with boilers
  - steam plant - steam traps, economiser, air, pre-heater, superheater, air/water separators, water treatment, feedwater pump and exhaust gas treatment
  - heat transfer rates to or from steam/water (any condition except supercritical)
  - steam throttling and formation of flash steam
  - steam heat exchangers and barrel calorimeters
  - steam plant for process heating
  - steam plant for power production
- refrigeration/heat pump encompassing:
  - basic principles and terminology
  - vapour compression cycle
  - performance criteria
  - types of refrigerant - designation, properties advantages and disadvantages
  - refrigerant properties using the pH diagram
  - ideal vapour compression cycle on the pH diagram
  - energy balance and heat transfers in compressor, evaporator and condenser
  - actual vapour compression cycle and variations from the ideal - pressure loss in lines and non-ideal compression
  - superheating and sub-cooling with or without suction/liquid heat exchanger

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    - Carnot principle applied to refrigerator and heat pump principles of evaporative refrigeration, absorption refrigeration, air cycle refrigeration and thermo-electric refrigeration
- daily irradiation encompassing:
    - definition of the terms: declination angle, reflectance, sunshine hours and extraterrestrial irradiation
    - solar radiation data tables and contour maps
    - determination, using field measurements and a sun path diagram, the times and dates when a photovoltaic (PV) array will be shaded by obstacles at a particular site
    - calculation of the daily average irradiation on a horizontal plane given extraterrestrial irradiation, location constants and sunshine hour data
    - calculation of the monthly mean daily irradiation falling on a PV array for each month of the year, adjusted for the effects of shading, using irradiance and irradiation data tables and a sun path diagram and/or appropriate software
- energy balance encompassing:
    - definitions of the terms: transmittance, absorptance, emittance, specific heat, absorber, heat removal factor and stagnation temperature
    - heat transfer mechanisms of conduction, convection and radiation and their operation in a simple fin and tube collector
    - how the transmittance, absorptance and emittance properties of materials used in the collector affect the performance of the collector
    - ways to reduce heat losses from a collector
    - energy balance and instantaneous efficiency equations for a collector
    - calculation of the collector constants from the instantaneous collector efficiency equation for a linear relationship
- solar collector encompassing:
    - five major factors that affect the selection of materials for solar collectors
    - features of collectors for low, medium and high temperature applications in terms of heat transfer, optical properties and materials of construction
    - the scope and content of Australian Standards (AS) AS/NZS 2712 Solar and heat pump water heaters, or similar standards
    - requirements of AS/NZS 2712 Solar and heat pump water heaters, or similar standards in one aspect of collector construction
    - tests required by AS/NZS 2712 Solar and heat pump water heaters, or similar standards with regard to collector construction
- solar collector performance encompassing:
    - scope and content of AS/NZS 2535 Test methods for solar collectors, and AS 2984 Solar water heaters – Method of test for thermal performance – Outdoor test method, or similar standards
    - method for testing the thermal performance of a solar collector or a solar water heater according to AS/NZS 2535 Test methods for solar collectors. and AS 2984 Solar water heaters – Method of test for thermal performance – Outdoor test method, or similar standards

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    - instantaneous efficiency of a solar collector for different inlet temperatures and flow rates
    - effect of varying inlet temperature and flow rate on the performance of a solar collector
    - efficiency curves for various types of solar collectors
    - performance of various types of solar water heaters in terms of their design, location and predicted solar fraction
- hydraulic circuits encompassing:
    - definition of the terms: equivalent length, static head, dynamic head and heat exchanger
    - configuration of a hydraulic circuit for a pumped storage solar water heating system
    - function of the components in the circuit
    - effects of water quality on the life and performance of components in the hydraulic circuit
    - suitable type and size components to minimise hydraulic and energy losses, including pipes, pumps, heat exchangers, expansion tanks, valves and filters for a hydraulic circuit with a given flow rate and head
    - safety requirements of the hydraulic circuit in terms of temperature, pressure and hydrogen gas release
    - requirements to balance flow through parallel/series combinations of collector arrays
    - suitable water and energy conservation measures, including user education, water conservation technologies and insulation
    - suitable types and level of insulation for system components to minimise heat losses
- domestic solar water heaters encompassing:
    - definition of the terms: thermosiphon system, pumped storage system and sacrificial anode
    - function of the components in a domestic solar water heater, including the collector, storage tank, valves, piping, differential controllers, pumps, insulation and support frames
    - schematic diagram of different types of system configurations showing collectors, storage tank, piping, pumps, filters, valves, heat exchangers and expansion tanks
    - factors which affect system performance, including storage tank and collector design, system location and collector orientation, water quality, hot water demand and usage pattern
    - safety requirements that prevent injury from high temperature water and hydrogen gas explosions during installation, maintenance and use of solar water heaters
    - demand for hot water and irradiation for a given location and collector tilt angle, orientation and shading
    - selection a suitably sized system for a given demand and location to meet a specific solar fraction and/or minimise life cycle cost
    - consequences of under/oversizing of solar water heating systems in terms of the effect on system performance, safety and life expectancy of components
    - installation, commissioning and maintenance requirements for a given situation

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including location and mounting of collectors, storage tanks, valves, pumps, pipes and ancillary fittings
    - energy conservation and efficiency measures that will enhance the performance of a solar water heater such as appropriate usage patterns, insulation, water conservation technologies and auxiliary energy tariffs
    - the capital cost, simple pay back and life cycle cost of solar and electric or gas hot water heaters according to AS 3595 and AS/NZS 4536 Life cycle costing
- commercial solar hot water heaters encompassing:
    - schematic diagrams for two different types of system configurations showing collectors, storage tank, piping, pumps, filters, valves, heat exchangers and expansion tanks
    - steps involved in the design of a commercial solar water heating system
    - assessment of the demand for hot water and irradiation for a given location and collector tilt angle, orientation and shading
    - selection of a suitably sized system for a given demand and location to meet a specific solar fraction and/or minimise life cycle cost
    - consequences of under/oversizing of a solar water heating system in terms of system performance, safety and life expectancy of components
    - installation, commissioning and maintenance requirements for a given situation, including location and mounting of collectors, storage tanks, valves, pumps, pipes and ancillary fittings
    - evaluation of energy conservation and efficiency measures that will enhance the performance of a solar water heater such as appropriate usage patterns, insulation, water conservation technologies and auxiliary energy tariffs
    - the capital cost, simple payback time and life cycle cost of solar and electric or gas hot water heaters according to AS 3595 and AS/NZS 4536 Life cycle costing
- pool solar hot water heaters encompassing:
    - function of the components of solar pool heating systems
    - typical system configuration
    - two factors which affect system performance
- heating system technologies encompassing:
    - types and their application
    - operating parameters of common systems
    - system component parameters and specifications
    - system performance and requirements
    - installation specifications and requirements
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing RE heating systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0031 Design stand-alone renewable energy (RE) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design stand-alone renewable energy (RE) systems and its installation.

It includes determining and developing stand-alone RE systems design, following design briefs, documenting design calculations and criteria, and obtaining design approval for stand-alone RE system.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0046 Solve problems in stand-alone renewable energy (RE) systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine stand-alone RE system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Scope of the stand-alone RE system and electrical installation is determined from design brief

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	1.3	Safety and regulatory requirements to which the electrical installation must comply are identified, obtained and applied
	1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved in the stand-alone RE system installation or associated work
2 Develop stand-alone RE system design	**2.1**	Stand-alone RE system performance requirements and compliance methods are applied to the design
	2.2	Alternative stand-alone RE system designs are considered in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the stand-alone RE design
	2.4	Stand-alone RE system design is drafted and checked for compliance with the design brief and regulatory requirements
	2.5	Stand-alone RE system design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with safely and effectively in accordance with workplace procedures
3 Obtain design approval for stand-alone RE system	**3.1**	Stand-alone RE system design is presented for approval and any issues clarified with client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s within the constraints of workplace policies
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with relevant performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing stand-alone RE systems must include at least the following:

- two different stand-alone RE systems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK139A Design stand-alone renewable energy (RE) systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0031 Design stand-alone renewable energy (RE) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- developing stand-alone renewable energy (RE) systems design.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- stand-alone RE system design, including:
  - load analysis and projected use
  - availability of sustainable/RE sources
  - incorporating diesel generating plant
  - component selection factors encompassing:
    - intended environment
    - distance between system and users
    - maintenance and serviceability requirements
    - rating and diversity

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  - installation requirement
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing stand-alone RE systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0032 Design wind energy conversion systems (WECS) rated to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to design wind energy conversion system (WECS) rated to 10 kilowatt (kW) and its installation.

It includes determining and developing WECS design, following design briefs, documenting design calculations and criteria, and obtaining design approval for WECS.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
UEECD0043 Solve problems in direct current circuits

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEERE0047 Solve problems in wind energy conversion systems (WECS) rated to 10 kW

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to design WECS	**1.1** Work health and safety (WHS)/occupational health and

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		safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2	Scope of the WECS is determined from design brief
	1.3	Safety and regulatory requirements to which the electrical installation must comply are identified, obtained and applied
	1.4	Design development work is planned to meet scheduled timelines in consultation with relevant person/s involved in the WECS installation or associated work
2 Develop WECS design	**2.1**	WECS performance standards and compliance methods are applied to the design
	2.2	Alternative WECS designs are considered in accordance with the design brief
	2.3	Safety, functionality and budgetary considerations are incorporated in the WECS design
	2.4	WECS design is drafted and checked for compliance with the design brief and regulatory requirements
	2.5	WECS design is documented for submission to relevant person/s for acceptance and approval
	2.6	Unplanned situations are dealt with safely and effectively in accordance with workplace procedures
3 Obtain design approval for WECS	**3.1**	WECS design is presented and any issues clarified with client representative and/or relevant person/s
	3.2	Requests for alterations to the design are negotiated with relevant person/s within the constraints of workplace policies
	3.3	Final design is documented and approval obtained from relevant person/s
	3.4	Quality of work is monitored in accordance with relevant performance agreement and/or workplace procedures or industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Designing WECS must include at least the following:

- two different WECS and their installation

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK131A Design wind energy conversion systems (WECS) rated to 10 kW.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0032 Design wind energy conversion systems (WECS) rated to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- developing outlines of alternative designs
- developing the design within the safety and functional requirements and budget limitations
- documenting and presenting design effectively
- successfully negotiating design alteration requests
- obtaining approval for final design
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices when designing wind energy conversion system (WECS) rated to 10 kilowatt (kW)
- designing WECS rated to 10 kW.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- design of small WECS, including:
  - wind characteristics encompassing:
    - definition of the terms: weather charts, isobars, fronts and troughs, cyclone and anti-cyclone, atmospheric boundary layer, geotropic wind, gradient wind, wind shear and wind rose
    - major global wind circulations and the formation of major wind flows over the continent
    - major features of the atmospheric boundary layer, including variation of wind speed with height according to logarithmic and power laws, and effects of surface roughness

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- atmospheric stability and temperature inversions turbulence
- major local winds, including trade winds, sea and land breezes, katabatic and anabatic winds
- likely effects on the major local winds from local topography, surface roughness, isolated barriers and temperature inversions
- typical diurnal, monthly and seasonal patterns of winds over the local area
- the formation and likely effects of extreme winds and wind shear

- wind speed data measurement and analysis encompassing:
  - definition of the terms: porosity, internal boundary layer, speed-up factor, temperature inversion factor, wind speed frequency distribution, lull period and calms
  - interpretation of local and regional wind speed and direction data such as local records (e.g. meteorological bureau data), ecological indicators and wind speed/energy maps
  - wind speed and direction using data logging anemometers
  - manufacturer's calibration curves for anemometers to correct recorded data
  - calculation at a site, monthly and yearly average wind speed, and wind power density from existing, nearby data or on-site measurements, using appropriate software
  - estimation of the wind speed at a WECS tower of suitable height and location given wind speed data recorded at two or more elevations at the site, and wind speed data recorded at one elevation and appropriate surface roughness, temperature inversion and speed-up factors at the site
- site selection encompassing:
  - the likely effects of local topography, surface roughness, isolated barriers and temperature inversions on a WECS at a given site
  - assessment of available local or regional wind speed, wind energy and direction data
  - selection of the most appropriate site-monitoring location taking into consideration factors such as topography, accessibility, surface roughness, shielding from isolated barriers (obstacles), turbulence, temperature inversions, power transmission distance, environmental and heritage impacts e.g. noise, visual, bird life, national parks or Indigenous sites
  - measurement of wind speed and direction data at an appropriate site and height(s) using a data logging anemometer over a sufficient period of time
  - analysis of the recorded wind speed and direction data to determine if the site is suitable for wind energy utilisation
- selection of WECS encompassing:
  - selection of suitable WECS specifications to suit site load and wind speed data according to AS/NZS 4509 Stand-alone power systems, including cut-in, rated and furling wind speeds, blade diameter, rated power at an appropriate rated wind speed and materials of construction
  - suitable commercially available WECS that most closely fits the specifications above
  - suitable tower requirements at the site, including site access, soil type and foundations, structural certification and planning approvals
  - calculation of the monthly and annual energy output of the selected WECS at the site from wind speed data and load data using appropriate computer software and in

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accordance with AS/NZS 4509 Stand-alone power systems
    - height of the tower and the size of the WECS for optimum use
    - suitable system configurations
    - balance of system components, including battery storage, inverter, regulator, transmission cable, back-up battery charger and generator
    - equipment reliability and manufacturer/supplier back-up service, including availability of spare parts and service personnel
    - installed capital and life cycle costs of various system configurations according to and AS/NZS 4536 Life cycle costing
    - environmental, cultural and social factors that impact on the implementation of a WECS such as external costs, WECS manufacturing processes and embodied energy and energy payback time, noise levels, visual amenity and RFI
- design principles of WECS rated to 10 kW
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing WECS rated to 10 kW
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0033 Develop engineering solutions to renewable energy (RE) problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop engineering solutions to renewable energy (RE) problems.

It includes determining and applying engineering solutions to RE systems and components and their operating parameters. It also includes applying problem-solving techniques, and testing and documenting alternative engineering solutions to RE problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0011 Design grid-connected photovoltaic power supply systems

UEERE0013 Develop strategies to address environmental and sustainability issues in the energy sector

UEERE0029 Design micro-hydro systems rated to 6.4 kW

UEERE0031 Design stand-alone renewable energy (RE) systems

UEERE0032 Design wind energy conversion systems (WECS) rated to 10 kW

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Determine RE problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
	1.2 Hazards are identified, WHS/OHS risks are assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Scope of the RE problem is determined from performance specifications, situation reports and in consultation with relevant person/s
	1.4 Activities are planned to meet scheduled timelines in consultation with person/s involved in the work
	1.5 Strategies are determined and solutions developed and implemented in accordance with workplace procedures
2 Develop engineering solutions for RE problems	**2.1** WHS/OHS risk control measures and workplace procedures are followed for carrying out work
	2.2 RE systems, components, construction, operation characteristics and applications are applied to develop engineering solutions to RE problems
	2.3 Parameters, specifications and performance requirements in relation to each RE problem are determined in accordance with workplace procedures
	2.4 Engineering solution/s to resolve RE problem/s is analysed to provide most effective solution/s
	2.5 Unplanned events are dealt with safely and effectively in accordance with regulatory requirements and workplace policies
	2.6 Quality of work is monitored in accordance with performance agreement and/or workplace procedures or relevant industry standards
3 Test, document and implement engineering solution for RE problem	**3.1** Engineering solution/s to RE problem/s is tested to determine their effectiveness and modified, as required
	3.2 Engineering solutions are documented and instructions for implementation that incorporate risk control

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measures included

3.3 Competent person/s to implement engineering solutions to RE problems is identified and coordinated in accordance with regulatory requirements and workplace policies

3.4 Justification for engineering solution/s used to solve RE problems is documented and included in work/project records in accordance with relevant industry standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Developing engineering solutions to RE problems must include at least the following:

- two RE problems

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK140A Develop engineering solutions to renewable energy (RE) problems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0033 Develop engineering solutions to renewable energy (RE) problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the renewable energy (RE) problem
- forming effective strategies for solution development and implementation
- obtaining RE system/component parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to RE problems
- documenting instruction for implementation of solutions that incorporate risk control measures to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- applying problem-solving techniques
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
- applying sustainable energy principles and practices
- preparing to develop engineering solution for RE problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

RE engineering, including:

- energy and humanity encompassing:
  - need for energy and relationship between energy usage and standard of living
  - energy conversion - typical processes and efficiencies
  - sources of energy

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  - solar energy - direct heating, photosynthesis, solar cells, power tower, hydrogen for solar energy, ocean thermal energy collector, solar ponds, wind and wave energy, and hydro-electric power
  - geothermal energy
  - tidal energy
  - nuclear energy - fission and fusion, burner and breeder reactors
  - stored fuel reserves
  - fuel conservation - reduction in wastage, recycling, greater usage efficiency and use of waste heat
  - thermodynamics
- basic concepts encompassing:
  - nature of matter - atoms, molecules, inter-molecular forces, molecular motion and states of matter
  - mass and conservation of mass principle
  - volume, density, specific volume and relative density
  - force, weight and pressure (atmospheric, gauge and absolute)
  - temperature (Celsius and Kelvin)
  - systems and black box analysis
  - reciprocating piston and cylinder mechanism – pressure ratio and compression ratio
- energy encompassing:
  - definition and principles
  - potential energy
  - kinetic energy
  - work (linear and rotational), constant and variable force, relationship to pressure and volume change
  - power (linear and rotational)
  - sensible heat - specific heat capacity (constant pressure and constant volume)
  - latent heat
  - chemical energy - energy content of a fuel
  - internal energy
- energy transfer in closed and open systems encompassing:
  - definition of a closed system
  - calorimetry as an example of a closed system (with or without phase change)
  - thermodynamics 1
  - non-flow energy equation - typical applications such as stirring with simultaneous heating or cooling
  - definition of an open system
  - mass and volume flow rate and continuity equation
  - steady flow energy equation (negligible change in kinetic or potential energy) leading to the concept of enthalpy - typical applications such as turbines, compressors, boilers and heat exchangers

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- gases encompassing:
  - definition of a perfect or ideal gas in terms of the molecular model
  - general gas equation
  - characteristic gas equation (equation of state)
  - constant pressure process
  - constant volume process
  - isothermal process
  - polytropic process
  - adiabatic process
- heat engines encompassing:
  - definition of a heat engine
  - essentials of a heat engine - heat source, heat sink, working substance, mechanical power output and working cycle
  - energy balance for a heat engine (as a black box) and efficiency
  - maximum possible efficiency (Carnot efficiency)
  - types of heat engines according to working substance, heat source, mechanical arrangement and working cycle
  - typical practical cycles - Stirling, Otto, diesel, dual, two-stroke (spark and compression ignition) and Joule cycle
  - thermodynamics 1
- heat engine performance encompassing:
  - measurement of torque and power output - rope brake, shoe brake, hydraulic dynamometer and electric dynamometer
  - heat supply rate, efficiency and specific fuel consumption
  - measurement of indicated power - mechanical indicator, electric/electronic indicator and Morse test
  - friction power, mechanical efficiency and indicated thermal efficiency
  - volumetric efficiency
  - energy balance
  - performance curves - variable load constant speed, and variable speed constant throttle setting
- structure of the existing generation, transmission and distribution system
- benefits, issues and impacts
- distributed generation technologies
- electrical power distribution systems operation encompassing:
  - electrical characteristics of feeders
  - causes of voltage problems in a power distribution system
  - voltage regulation limits
  - calculations for feeder voltage drops
  - methods of voltage control
  - fault types, causes and effects

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    - determination of fault levels
    - fault level limitation
- protection and relaying encompassing:
    - protection system purpose and features
    - application of protection in a distribution network
    - protection system terminology
    - feeder protection systems
- distributed generation issues encompassing:
    - utility requirements for interconnection
    - safety of personnel
    - islanding
    - grid stability
    - voltage regulation
    - potential benefits of distributed generation
    - limitations in design of distribution circuits (designed for one-way operation)
    - match between supply and demand
    - operation: dispatchable and non-dispatchable supplies
    - factors affecting the sizing of distributed generation
    - use of energy storage
    - case studies
- RE supplies issues encompassing:
    - limits to penetration
    - factors affecting the value of renewables on the grid
    - implications of renewable input on power system operation
    - connection of energy systems via inverters: AS 4777 Grid connection of energy systems via inverters
- factors affecting the uptake of distributed generation encompassing:
    - institutional factors
    - regulatory factors
    - policy including mandated targets
    - green power market
    - financial issues
    - contractual issues
    - case studies
- engineering solutions to RE problems
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures

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- RE engineering principles
- sustainable energy principles and practices

Assessment Conditions

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solutions to RE problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0034 Diagnose and rectify faults in renewable energy (RE) control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to diagnose and rectify faults in renewable energy (RE) control systems.

It includes preparing to diagnose and rectify faults, diagnosing and rectifying faults in RE control systems**,** and completing and reporting fault-finding and repair activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with

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		workplace procedures prior to commencing work
	1.3	Extent of work to be undertaken is determined from fault/breakdown reports and/or discussions with relevant person/s
	1.4	Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.5	Materials required for the work are identified and accessed in accordance with workplace procedures
	1.6	Tools, equipment and testing devices required to locate faults are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Diagnose and rectify faults in RE control systems	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	Safety hazards resulting from the fault or breakdown are documented and risk control measures identified and implemented in consultation with relevant person/s
	2.5	Fault finding of RE systems and interconnecting circuits is approached methodically using measured and calculated values of circuit/apparatus parameters
	2.6	Circuit/apparatus components are dismantled, as required, and parts stored to protect against loss or damage
	2.7	Faulty circuits/components are rechecked and their fault status confirmed
	2.8	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of repair is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, tested and prepared for return

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		to service
	2.11	Unexpected events are dealt with safely and with approval of authorised person/s
	2.12	Fault-finding and repair activities are completed without damage to apparatus, circuits, the surrounding environment and services using sustainable energy practices
3 Complete and report fault-finding and repair activities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Justification for repairs to apparatus is documented in accordance with workplace procedures
	3.4	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

RE system fault finding and repairing must include at least four of the following:	• open circuit • short circuit • incorrect connections • insulation failure • unsafe condition • apparatus/component failure • related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK127A Diagnose and rectify faults in renewable

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energy control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0034 Diagnose and rectify faults in renewable energy (RE) control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- envisaging the likely extent of work from fault/breakdown reports and discussions with appropriate person/s
- using methodical fault-finding techniques
- finding faults efficiently
- rectifying faults effectively
- completing documentation correctly
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/system
- determining live electrical testing/measurement requirements
- dismantling and reassembling circuit/apparatus components
- identifying and accessing materials, tools, equipment and testing devices
- testing repairs.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- renewable energy (RE) system electronics, including:
  - fault-finding techniques encompassing:
    - factors to consider in clarifying the nature of a fault:
      - initial fault report
      - confirmation of symptoms of the fault
      - comparison of symptoms with normal operation

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        - effect to cause reasoning — assumptions of possible causes
    - methods for testing assumptions:
        - visual inspection
        - sectional testing
        - split-half tests
        - component isolation
    - dealing with intermittent faults
- semiconductor components encompassing:
    - symbols for common semiconductor components, including rectifier diodes, light-emitting diodes (LEDs), zener diodes, bipolar transistors, darlington pairs, MOSFETs, IGBTs, SCRs and triacs
    - basic function of these devices above
    - major rating parameters of devices above
    - applications for each device
    - I-V curve characteristics of diodes and the current gain characteristic of bipolar transistors
- linear regulated direct current (d.c.) power supplies encompassing:
    - label circuit diagrams for half wave and full wave, single phase and three phase rectifiers
    - voltage and current waveforms for these rectifier circuits with and without capacitor filtering
    - peak output voltages from single phase and three phase rectifier circuits
    - block diagram showing the structure of a regulated d.c. power supply
    - main features of linear integrated circuit and voltage regulator integrated circuits
    - each of the major components and their physical location in a regulated power supply
- switching power control circuits encompassing:
    - power dissipation of a transistor when operated as a switch
    - how pulse width modulation (PWM) can provide a variable output voltage from a switch mode regulator
    - advantages and disadvantages of switch mode power circuits compared with linear power circuits
    - block diagram of a basic photovoltaic (PV) switching voltage regulator for battery charging
    - applications of switch mode circuits found in RE systems
    - how power control in alternating current (a.c.) circuits is achieved using SCRs and triacs
    - methods used to reduce radio frequency interference (RFI) in d.c. and a.c. circuits utilising high-speed switching
- digital electronic circuits encompassing:
    - characteristic features that distinguish analogue and digital devices and circuits
    - how numbers or text information can be represented using binary numbers and how

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these are represented in digital circuits
    - operation of voltage comparators, analogue to digital (A-D) converters, and digital to analogue (D-A) converters, and examples of each one's use in a RE application
    - basic function of microcontrollers, volatile and non-volatile memory devices
    - operation of a solar hot water (SHW) system pump differential controller as an example of the use of logic in digital circuits
- inverters encompassing:
    - basic function of inverters and d.c converters and their use in RE systems
    - the operation of an inverter bridge and half-bridge
    - output voltage waveforms for square wave, modified square wave and synthesised sine wave inverters showing typical voltages and timing
    - the function of PWM techniques in modified square wave and synthesised sine wave inverters
    - block diagrams showing the structure of common forms of d.c converters and inverters used in RE applications
- maintenance encompassing:
    - safety procedures for work on electronic systems, circuits and apparatus
    - hazards that may be encountered when performing tests on inverters, battery chargers or other equipment containing low voltage (LV) circuits
    - functionality of electronic equipment through appropriate client questioning and application of systematic tests and observation
    - various types of common faults and their causes in RE electronic equipment
    - typical test equipment used to repair electronic and electrical equipment
    - safe and correct use of tools and test equipment to locate electronic equipment faults under the direction of an electronics technician
    - replacement of circuit boards, observing appropriate handling precautions for static sensitive devices
    - replacement of socketed integrated circuits such as EPROMs or microprocessors using appropriate tools and methods
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- RE control systems.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

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requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to diagnosing faults in RE control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0035 Install ELV stand-alone photovoltaic power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install extra-low voltage (ELV) stand-alone photovoltaic (PV) power systems.

It includes preparing to install ELV stand-alone PV power apparatus and systems, installing ELV stand-alone PV power apparatus and system, completing installation and reporting installation activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0022 Solve basic problems in photovoltaic energy apparatus and systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install ELV stand-alone PV power apparatus and systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS hazards are identified, risks assessed, reported to relevant person/s and workplace procedures

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		for risk control measures applied in preparation for work
	1.3	System installation is planned in consultation with others impacted by the work and sequenced appropriately
	1.4	Nature and location of the work are determined from documentation or relevant person/s to determine the scope of work
	1.5	Sitting limitations and customer system requirements are identified through consultation with relevant person/s
	1.6	Energy demand is assessed and recommendations made to the customer for energy efficiency improvements, as necessary
	1.7	Suitable system components are specified and selected in accordance with workplace procedures
	1.8	Location of system components is planned within the constraints of the building structure and regulations
	1.9	Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.10	Materials and components required are obtained, pre-assembled, where necessary, and checked against job requirements in accordance with workplace procedures
	1.11	Materials and components are prepared for transport to the site and transport is arranged in accordance with workplace procedures
	1.12	Tools, equipment and testing devices required are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.13	Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements
2 Install ELV stand-alone PV power apparatus and systems	**2.1**	Equipment is transported safely to site in accordance with workplace procedures
	2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures

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	2.3	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4	System components are installed in compliance with technical industry standards, job specifications and requirements, and with sufficient access to enable terminations, adjustment and maintenance
	2.5	Wiring is terminated at components and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
	2.6	Unplanned situations are discussed with relevant person/s and responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.7	Checks of installed apparatus quality are conducted in accordance with workplace procedures
	2.8	System installation is conducted minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete installation and report installation activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Final checks are conducted to confirm installed apparatus conforms to requirements
	3.3	System operation is tested and installation verified as compliant with standards and work specifications
	3.4	‘As-installed’ apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures
	3.5	Customer is informed of system operation, routine maintenance and limitations
	3.6	Documentation required by standards or job specifications is provided to the customer

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK134A Install ELV stand-alone photovoltaic power systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0035 Install ELV stand-alone photovoltaic power systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- assessing customer energy requirements, efficiency improvements and site limitations
- reading and interpreting drawings related to and apparatus locations and circuit connections
- placing and securing system components accurately
- maintaining fire integrity
- connecting system components to comply with requirements
- testing system operation and verifying compliance with standards and job specifications
- completing necessary documentation, including handing over system operational documents to the customer and informing customer of system operation, routine maintenance and limitations
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- conducting quality checks during installation
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- installing and setting up stand-alone extra-low voltage (ELV) photovoltaic (PV) power systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- stand-alone ELV PV systems, including:
  - PV array installation requirements encompassing:
    - WHS/OHS requirements and methods for working on roofs

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    - common methods of roof construction (rafters and tile battens) and methods to ensure integrity of waterproofing
    - common types of roof-mounted and free-standing PV array frame construction and methods of tilt angle adjustment
    - fixing methods for different roof types
    - array mounting methods for north orientation roof sections and non-north facing roof sections
    - aesthetic considerations in choosing an appropriate array location and type of mounting
    - the mounting and fixing methods for at least one type of domestic available building integrated PV product
- electrical PV array installation requirements encompassing:
    - methods used in wiring and connecting PV arrays in accordance with Australian Standards AS/NZS 4509 Stand-alone power systems and AS 5033 Installation and safety requirements for photovoltaic (PV) arrays
    - considerations involved in wiring of series connected PV modules in order to minimise power losses due to shading
    - PV array wiring diagram, including the placement of blocking and bypass diodes
    - considerations involved in choosing the location of associated system equipment, including regulators and direct current (d.c.) control board
    - cable route from PV array/s to regulators so as to minimise the route length to battery
- system installation and maintenance encompassing:
    - installation work on a PV power system in accordance with relevant standards and WHS/OHS guidelines
    - correct isolation and shutdown procedures prior to carrying out maintenance tasks
    - routine maintenance tasks on PV arrays
    - required vegetation control to remove or reduce shading or soiling on a PV array
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0036 Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install small wind energy conversion systems (WECS) rated up to 10 kilowatt (kW) for extra-low voltage (ELV) stand-alone applications.

It includes preparing to install small ELV WECS, installing small ELV WECS, completing installation and reporting installation activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0047 Solve problems in wind energy conversion systems rated up to 10 kW

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install small ELV WECS	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS risks are identified and workplace procedures for risk control are applied in preparation for work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 System installation is planned in consultation with others impacted by the work and sequenced appropriately
	1.5 Nature and location of the work are determined from documentation or relevant person/s to determine the scope of work
	1.6 Sitting limitations and customer system requirements are identified in consultation with the customer
	1.7 Suitable system components are specified and selected in accordance with workplace procedures
	1.8 Location of system components is planned within the constraints of the building structure and regulations
	1.9 Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.10 Materials and components required are obtained in accordance with workplace procedures, pre-assembled, where necessary, and checked against job requirements
	1.11 Materials and components are prepared for transport to the site and transport is arranged
	1.12 Tools, equipment and testing devices required are obtained in accordance with workplace procedures and checked for correct operation and safety

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	1.13	Preparatory work is checked to ensure no unnecessary damage has occurred previously and complies with requirements
2 Install small ELV WECS	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Equipment is transported safely to the site in accordance with workplace procedures
	2.3	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.4	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.5	System components are installed in compliance with technical industry standards, job specifications and requirements, and with sufficient access to enable terminations, adjustment and maintenance
	2.6	Wiring is terminated at components and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
	2.7	Unexpected events are discussed with relevant person/s, dealt with and documented in accordance with workplace procedures
	2.8	Unexpected situations are dealt with safely and with the approval of authorised person/s
	2.9	Quality checks of installed apparatus are conducted in accordance with workplace procedures
	2.10	System installation is completed minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete installation and report installation activities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures

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3.3 Final checks are conducted to confirm installed apparatus conforms to requirements

3.4 System operation is tested and installation verified as compliant with industry standards and work specifications

3.5 'As-installed' apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures

3.6 Customer is informed of system operation, routine maintenance and limitations

3.7 Documentation required by industry standards or job specifications is provided to the customer

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK143A Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0036 Install small wind energy conversion systems rated up to 10 kW for ELV stand-alone applications

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- assessing customer energy requirements, efficiency improvements and site limitations
- reading and interpreting drawings related to and apparatus locations and circuit connections
- placing and securing system components accurately
- maintaining fire integrity
- connecting system extra-low voltage (ELV) components to comply with requirements
- testing system operation and verifying compliance with standards and job specifications
- completing necessary documentation, including handing over system operational documents to the customer
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- installing and setting up small wind energy conversion systems (WECS) for ELV stand-alone application for one mainstream type of small WECS.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation and maintenance of small ELV WECS, including:
  - installation of an ELV WECS encompassing:
    - selection of an appropriate tower for the installation of a WECS taking into consideration soil type and footings, local council approvals, appropriate codes,

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AS/NZS 1170.2 Structural design actions - Wind actions, and transport of tower
    - appropriate methods and safety procedures for raising tower and WECS, lightning protection, tower maintenance, safety in the erection and maintenance of the tower and WECS, and site management to minimise environmental impacts
    - appropriate electrical transmission voltage and cable size from the WECS to the load or energy storage
    - appropriate installation, commissioning, fault diagnosis and rectification using appropriate safety procedures, including WECS power output, voltage regulation, and transmission cable voltage drop, manual and automatic furling, and shutdown
    - schematic and wiring diagrams for the WECS showing the general circuit layout and protection between the WECS, energy storage, inverter and loads according to AS/NZS 3000 Electrical installation (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems, and lightning protection requirements
    - suitable layout for the location of energy storage to meet AS/NZS 3000 Electrical installation (known as the Australian/New Zealand Wiring Rules), AS 3011.1 Electrical installations - Secondary batteries installed in buildings - Vented cells and AS/NZS 4509 Stand-alone power systems
    - safety procedures for the installation, commissioning, fault diagnosis of system components
  - maintenance of an ELV WECS encompassing:
    - appropriate methods and safety procedures for tower maintenance
    - appropriate maintenance methods and safety procedures, including WECS power output, voltage regulation, and transmission cable voltage-drop, manual and automatic furling, and shutdown
    - safety procedures for the maintenance of system components
    - maintenance schedule for the system
- tower maintenance
- relevant industry standards
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing small WECS for stand-alone applications
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0037 Install, configure and commission LV micro-hydro systems rated up to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install, configure and commission low voltage (LV) micro-hydro systems rated up to 6.4 kilowatt (kW).

It includes preparing to install LV micro-hydro systems, installing LV micro-hydro systems, and completing and reporting installation activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

UEERE0045 Solve basic problems in micro-hydro systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install LV micro-hydro systems	**1.1** WHS/OHS processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS hazards are identified, risks assessed, reported to relevant person/s and workplace procedures for risk control measures applied in preparation for work
	1.3 System installation is planned in consultation with others impacted by the work and sequenced appropriately
	1.4 Nature and location of the work are determined from documentation or relevant person/s to determine the scope of work
	1.5 Location of system components is planned within the constraints of the building structure and regulations
	1.6 Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.7 Material required is obtained in accordance with workplace procedures and checked against job requirements
	1.8 Tools, equipment and testing devices required are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements
2 Install LV micro-hydro systems	**2.1** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3 System components are installed in compliance with technical standards, job specifications and requirements, and with sufficient access to enable terminations,

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		adjustment and maintenance
	2.4	Wiring is terminated at system components in accordance with manufacturer specifications and functional and regulatory requirements
	2.5	Unplanned situations are discussed with relevant person/s and responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
	2.6	Checks of installed apparatus quality are conducted in accordance with workplace procedures
	2.7	Apparatus installation is conducted minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete and report installation activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Final checks are conducted to confirm installed apparatus conforms to requirements
	3.3	'As-installed' apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK136A Install, configure and commission LV micro-hydro systems rated up to 6.4 kW.

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Links

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Assessment Requirements for UEERE0037 Install, configure and commission LV micro-hydro systems rated up to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- reading and interpreting drawings related to and apparatus locations and circuit connections
- placing and securing system components accurately
- maintaining fire integrity
- connecting system components to comply with requirements
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- installing and setting up low voltage (LV) micro-hydro systems, including:
  - conducting quality checks.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- micro-hydro systems LV installation and maintenance processes, including:
  - micro-hydro systems LV installation processes encompassing:
    - selection of an appropriate micro-hydro system taking into account the topology of the site, local council approvals, environmental considerations, site access and transport of equipment, water and power transmission distances and daily and seasonal load profiles
    - appropriate methods, using appropriate safety procedures, for dam or weir construction, watercourse construction and/or penstock installation, and turbine installation

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    - appropriate installation, testing, commissioning, fault diagnosis and rectification procedures using appropriate safety procedures
    - schematic and wiring diagrams for the micro-hydro system showing the general circuit layout and protection between the micro-hydro system, batteries, inverter and loads according to AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems, and AS 4086.2 Secondary batteries for use with stand-alone power systems – Installation and maintenance requirements
    - safety procedures for the installation, commissioning, fault diagnosis of system components
- micro-hydro systems maintenance processes encompassing:
    - appropriate maintenance methods using appropriate safety procedures
    - maintenance schedule for the system
    - safety procedures for the maintenance of system components
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing and setting up LV micro-hydro systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0038 Install, configure and commission LV wind energy conversion systems rated up to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install, configure and commission low voltage (LV) wind energy conversion system (WECS) rated up to 10 kilowatt (kW).

It includes preparing to install LV WECS, installing LV WECS, completing installation and reporting installation activities.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

UEERE0047 Solve problems in wind energy conversion systems rated up to 10 kW

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install LV WECS	**1.1** WHS/OHS processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS risks are identified and workplace procedures for risk control are applied in preparation for work
	1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4 System installation is planned in consultation with others impacted by the work and sequenced appropriately
	1.5 Nature and location of the work are determined from documentation or relevant person/s to determine the scope of work
	1.6 Sitting limitations and customer system requirements are identified by consultation with the customer
	1.7 Suitable system components are specified and selected in accordance with workplace procedures
	1.8 Location of system components is planned within the constraints of the building structure and regulations
	1.9 Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.10 Materials and components required are obtained in accordance with workplace procedures, pre-assembled, as required, and checked against job requirements
	1.11 Materials and components are prepared for transport to the site and transport is arranged in accordance with workplace procedures
	1.12 Tools, equipment and testing devices required are obtained in accordance with workplace procedures and checked for correct operation and safety

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	1.13	Preparatory work is checked to ensure no unnecessary damage has occurred previously and complies with requirements
2 Install LV WECS	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Equipment is transported safely to the site in accordance with workplace procedures
	2.3	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.4	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.5	System components are installed in compliance with technical industry standards, job specifications and requirements, and with sufficient access to enable terminations, adjustment and maintenance
	2.6	Wiring is terminated at components and associated equipment in accordance with manufacturer specifications and functional and regulatory requirements
	2.7	Unexpected events are discussed with relevant person/s, dealt with and documented in accordance with workplace procedures
	2.8	Unexpected situations are dealt with safely and with the approval of authorised person/s
	2.9	Quality checks of installed apparatus are conducted in accordance with workplace procedures
	2.10	System installation is completed minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete installation and report installation activities	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures

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3.3 Final checks are conducted to confirm installed apparatus conforms to requirements

3.4 System operation is tested and installation verified as compliant with industry standards and work specifications

3.5 'As-installed' apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures

3.6 Customer is informed of system operation, routine maintenance and limitations

3.7 Documentation required by industry standards or job specifications is provided to the customer

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK144A Install, configure and commission LV wind energy conversion systems rated up to 10 kW.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0038 Install, configure and commission LV wind energy conversion systems rated up to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- assessing customer energy requirements, efficiency improvements and site limitations
- reading and interpreting drawings related to and apparatus locations and circuit connections
- placing and securing system components accurately
- maintaining fire integrity
- connecting system low voltage (LV) components to comply with requirements
- testing and commissioning system operation and verifying compliance with standards and job specifications
- completing necessary documentation, including handing over system operational documents to the customer
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- installing and setting up a mainstream type, wind energy conversion system (WECS) for LV application
- transporting equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- installation and maintenance of LV WECS, including:
  - installation of a LV WECS encompassing:

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- selection of an appropriate tower for the installation of a WECS taking into consideration soil type and footings, local council approvals, appropriate codes, AS/NZS 1170.2 Structural design actions - Wind actions, and transport of tower
- appropriate methods and safety procedures for raising tower and WECS, lightning protection, tower maintenance, safety in the erection and maintenance of the tower and WECS, and site management to minimise environmental impacts
- appropriate electrical transmission voltage and cable size from the WECS to the load or energy storage
- appropriate installation, commissioning, fault diagnosis and rectification using appropriate safety procedures, including WECS power output, voltage regulation, and transmission cable voltage drop, manual and automatic furling, and shutdown
- schematic and wiring diagrams for the WECS showing the general circuit layout and protection between the WECS, energy storage, inverter and loads according to AS/NZS 3000 Electrical installation (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems, and lightning protection requirements
- suitable layout for the location of energy storage to meet AS/NZS 3000 Electrical installation (known as the Australian/New Zealand Wiring Rules), AS 3011.1 Electrical installations - Secondary batteries installed in buildings - Vented cells and AS/NZS 4509 Stand-alone power systems
- safety procedures for the installation, commissioning, fault diagnosis of system components

- maintenance of a LV WECS encompassing:
  - appropriate methods and safety procedures for tower maintenance
  - appropriate maintenance methods and safety procedures, including WECS power output, voltage regulation, and transmission cable voltage-drop, manual and automatic furling, and shutdown
  - safety procedures for the maintenance of system components
  - maintenance schedule for the system
- tower maintenance
- relevant industry standards
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing WECS for LV applications
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0039 Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install, adjust, set up and maintain extra-low voltage (ELV) micro-hydro systems rated up to 6.4 kilowatt (kW).

It includes preparing to install ELV micro-hydro systems, installing ELV micro-hydro systems, and completing and reporting installation activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0045 Solve basic problems in micro-hydro systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install ELV micro-hydro systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS hazards are identified, risks assessed,

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		reported to relevant person/s and workplace procedures for risk control measures applied in preparation for work
	1.3	System installation is planned in consultation with others impacted by the work and sequenced appropriately
	1.4	Nature and location of the work is determined from documentation or relevant person/s to determine the scope of work
	1.5	Location of system components is planned within the constraints of the building structure and regulations
	1.6	Instructions for coordinating work with others are obtained from relevant person/s and applied
	1.7	Materials required are obtained in accordance with workplace procedures and checked against job requirements
	1.8	Tools, equipment and testing devices required are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9	Preparatory work is checked to ensure no damage has occurred and compliance with requirements
2 Install ELV micro-hydro systems	**2.1**	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.2	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	System components are installed in compliance with technical industry standards, job specifications and requirements, and with sufficient access to enable terminations, adjustment and maintenance
	2.4	Wiring is terminated at system components in accordance with manufacturer specifications and functional and regulatory requirements
	2.5	Unplanned situations are discussed with relevant person/s and responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

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	2.6	Checks of installed apparatus quality are conducted in accordance with workplace procedures
	2.7	Apparatus installation is conducted minimising waste of materials, damage to apparatus, circuits, the surrounding environment and services using sustainable energy principles
3 Complete and report installation activities	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Final checks are conducted to confirm installed apparatus conforms to requirements
	3.3	'As-installed' apparatus and associated equipment are documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK137A Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0039 Install, set up and maintain ELV micro-hydro systems rated up to 6.4 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- reading and interpreting drawings related to and apparatus locations and circuit connections
- placing and securing system components accurately
- maintaining fire integrity
- connecting system components to comply with requirements
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- conducting quality checks
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- installing and setting up stand-alone extra-low voltage (ELV) micro-hydro systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- micro-hydro systems ELV installation and maintenance processes, including:
  - micro-hydro systems ELV installation processes encompassing:
    - selection of an appropriate micro-hydro system taking into account the topology of the site, local council approvals, environmental considerations, site access and transport of equipment, water and power transmission distances, and daily and seasonal load profiles
    - appropriate methods and safety procedures for dam or weir construction, watercourse construction and/or penstock installation, and turbine installation
    - appropriate installation, testing, commissioning, fault diagnosis and rectification

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procedures using appropriate safety procedures
    - schematic and wiring diagrams for the micro-hydro system showing the general circuit layout and protection between the micro-hydro system, batteries, inverter and loads according to Australian Standards AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems, and AS 4086.2 Secondary batteries for use with stand-alone power systems - Installation and maintenance requirements
    - safety procedures for the installation, commissioning, fault diagnosis of system components
- micro-hydro systems maintenance processes encompassing:
    - appropriate maintenance methods using appropriate safety procedures
    - maintenance schedule for the system
    - safety procedures for the maintenance of system components
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing and setting up ELV micro-hydro systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UEERE0040 Maintain and monitor remote area essential service operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain and monitor remote area essential service operations.

It includes preparing to maintain a power station compound, monitoring performance, developing maintenance schedules, completing work and reporting outcomes.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERE0023 Work safely with remote area power supply systems

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to maintain remote area power supply (RAPS) compound and monitor	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote area power station facility are identified and applied in accordance with workplace routines and procedures

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	performance	
		1.2 Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
		1.3 Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
		1.4 Nature and location of remote area power station facility is obtained from documentation or from relevant person/s to determine the scope of work
		1.5 Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
		1.6 Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
		1.7 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
		1.8 Defective and unsafe tools and service equipment are repaired or replaced in accordance with workplace procedures
2	**Maintain RAPS compound and monitor performance**	**2.1** Workplace risk control measures and procedures are applied
		2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
		2.2 Power station building, generating equipment and compound are cleaned and tidied to maintain a safe and efficient plant area in accordance with workplace procedures
		2.3 Inspection and reporting are conducted on suitability, location and legibility of safety signage
		2.4 Inspection and reporting are conducted on location, suitability and condition of firefighting equipment
		2.5 Performance status and fuel and oil use of generation equipment is monitored and logged based on information obtained from instruments, meters and

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		measuring devices
	2.7	Non-routine events are referred to relevant person/s for directions in accordance with workplace procedures
	2.8	Quality checks are conducted in accordance with instructions and workplace procedures
3 Develop maintenance schedule and complete work report	**3.1**	Workplace risk control measures and procedures are applied
	3.2	Maintenance schedule is developed based on logged information on power station performance status and condition of compound
	3.3	Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
	3.4	Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK118A Maintain and monitor remote area essential service (RAPS) operations.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0040 Maintain and monitor remote area essential service operations

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the location and nature of the work required
- following established procedures for repairing or replacing defectives tools and service equipment
- cleaning and tidying remote area power station building, generating equipment and compound effectively
- inspecting and reporting suitability, location and legibility of safety signage
- inspecting and reporting location, suitability and condition of firefighting equipment
- monitoring and logging performance, status and fuel and oil use of generation equipment
- developing an appropriate basic maintenance schedule from logged information
- documenting work activities accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/system
- completing relevant documentation/reporting
- conducting quality checks
- coordinating work with relevant person/s
- determining scope of work from documentation and/or relevant person/s
- identifying and accessing materials, tools, equipment and testing devices
- identifying deterioration and damage to facilities
- identifying maintenance issues beyond the scope of work and notifying relevant person/s
- maintaining and monitoring remote area essential service operations
- preparing to maintain power station compound and monitor performance.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- power station and compound maintenance, remote area power supply (RAPS) compound maintenance and meter reading, including:
  - maintaining clean, tidy and safe condition of the RAPS building and generating equipment encompassing:
    - removal of generating plant oil, coolant and fuel leaks
    - removal fluid spills from plant room floor areas
    - cleaning of RAPS ventilation systems
    - removal of insects and fauna from plant area
    - environmentally safe disposal of used consumables and rubbish
    - repositioning emptied rubbish bins
    - correct storage of plant spares
  - maintaining a clean, tidy and safe working environment of RAPS compound encompassing:
    - repairing and securing compound perimeter fencing and gates
    - removal and environmentally safe disposal of flora from the fence line and plant room perimeter
    - removal and environmentally safe disposal of compound rubbish
    - cutting and watering the compound grassed area
    - safe arrangements for storage of fuel drums and other flammable liquids
    - maintaining water reticulation equipment
  - inspecting, classifying and repairing the RAPS tools and equipment encompassing:
    - inspecting and reporting hand tools and service equipment for serviceability
    - equipment repair procedures
    - cleaning and storage of tools and equipment
  - inspecting and reporting on the safety signage displayed in the RAPS and on the perimeter fence encompassing:
    - types and location of safety signs relevant to a community RAPS and compound
    - reporting on the conditions and suitability of the signs
  - locating, inspecting and reporting on the fixed and portable firefighting equipment contained in and around the power station encompassing:
    - types of firefighting equipment suitable for a power station
    - typical locations of power station firefighting equipment
    - inspecting and reporting suitability and condition of firefighting equipment
  - instruments/meters showing performance/status of community power stations encompassing:
    - types of information displayed on the instrument panel and switchboards (engine oil pressure, coolant temperatures fuel pressure/flow, amperes, voltage, kilowatt, kilowatt hours, frequency, Hertz and engine running hours)
    - instrument/meter reading and recording techniques
    - dip stick measurement and recording methods of bulk fuel and engine oil
  - maintenance schedules from logged information of community power station

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performance encompassing:

- logged information
- maintenance schedules, including timely ordering of fuel, coolant and engine oil, engine oil changes, engine oil filter changes, fan belt condition and adjustment, air cleaner element service, minor tune up requirements, valve adjustments and minor and major overhaul work

- instrument/meter reading and maintenance scheduling records
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0041 Maintain operation of remote area power generation plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain operation of remote area power generation plant where the exposed voltage is not greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c).

It includes preparing for, conducting, completing and reporting on maintenance of power generation plant.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0018 Maintain and repair remote area power generation facilities

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for maintenance	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements for a remote area power generation plant are identified and applied in accordance with workplace procedures

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	1.2	Risks are identified, assessed and control measures applied in accordance with workplace procedures prior to commencing work
	1.3	Risks/hazards are identified, assessed, reported to relevant person/s and control measures implemented
	1.4	Nature and location of the power plant are obtained from documentation or from work supervisor to determine the scope of work to be undertaken
	1.5	Advice on coordinating work with others and the local community is obtained from relevant person/s and applied
	1.6	Sources of materials required for work are identified and accessed in accordance with workplace routines and procedures
	1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Conduct maintenance work	**2.1**	Workplace risk control measures and procedures are applied
	2.2	Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.3	Relevant maintenance procedures are applied to test and check remote area power plant
	2.4	Known types of remote area power plant functional faults are identified and repaired in accordance with workplace procedures
	2.5	Maintenance performance measurements and repairs are conducted safely in accordance with workplace routines and procedures
	2.6	Workplace procedures are applied for referring non-routine events to relevant person/s for directions
	2.7	Maintenance and repair work is conducted minimising waste of materials, energy, damage to apparatus, circuits, the surrounding environment and services
	2.8	Quality checks are conducted in accordance with instructions and workplace procedures

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3	**Complete maintenance work and reporting**	**3.1** Workplace risk control measures and procedures are applied
		3.2 Worksite is cleaned and made safe in accordance with workplace procedures
		3.3 Maintenance issues beyond the scope of work are referred to relevant person/s in accordance with workplace procedures
		3.4 Work completed is reported to relevant person/s in accordance with maintenance reporting and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK120A Maintain operation of remote area power generation plant.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0041 Maintain operation of remote area power generation plant

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- understanding the location and nature of the work required
- following prescribed procedures to testing and checking plant
- identifying and repairing known functional faults
- carrying out maintenance and repairs effectively
- identifying maintenance issues beyond the scope of prescribed work and notifying appropriate person/s
- documenting work activities accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- checking isolation of circuits/machines/systems
- conducting quality checks
- identifying and accessing materials, tools, equipment and testing devices
- maintaining operation of remote area power generation plant.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- minor servicing of a remote area power generating plant encompassing:
    - engine oil and filters
    - fuel filters
    - coolant filters
    - water trap devices
    - air cleaners
- minor maintenance of a remote area power generating plant encompassing:
    - fan and accessory drive belts

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    - repair of minor leaks: coolant, oil and fuel
- servicing of a remote area power generating plant battery systems encompassing:
    - starting battery set
    - switchboard (nicad) batteries
- information displayed by the instruments/meters in a remote area power generating plant encompassing:
    - generating equipment (diesel engine)
    - engine lubrication
    - system oil pressure
    - engine cooling system coolant
    - temperature (in and out)
    - fuel pressure
    - current
    - voltage
    - power (kW)
    - kilowatt hours
    - frequency, hertz (Hz)
    - engine running hours
    - station services: fuel tank dip and lubricating oil tank level
    - fuel flow meter
- use of the information gathered from instruments/meters encompassing:
    - ordering of fuel, lubricating oil and coolant
    - scheduling regular servicing and maintenance for engine oil and filter changes, fuel filters, drive belt (condition/adjustment), valve adjustments (if applicable), major and minor mechanical servicing by outside agents and air cleaner (both dry paper and oil bath types)
- power plant log sheets and readings encompassing:
    - completed log sheets
    - forwarding information to appropriate person/location at regular intervals (weekly)
- general cleanliness of the power generating plant and buildings encompassing:
    - generation plant
    - oil leaks
    - water leaks
    - fuel leaks
    - safety awareness
    - plant buildings
    - internal floor area
    - used consumables
    - spare parts storage
    - spider webs and other pests

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    - rubbish containers
    - ventilation
    - power station compound
    - fence and gate (if applicable)
    - weeds
    - grass (if applicable)
    - rubbish containers
    - fuel and oil supply (drums)
    - water reticulation (if applicable)
    - tools and equipment
    - location/storage
    - cleanliness
    - maintenance
    - drain/drip tins
    - safety signage
    - location
    - condition
    - suitability
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE)

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currently used in industry
- resources that reflect current industry practices in relation to maintaining operation of remote area power generation plant
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0042 Manage renewable energy (RE) projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to manage renewable energy (RE) projects. It includes determining the scope of the project, managing the project and completing the project.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Determine scope of the RE project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified, interpreted and applied in accordance with workplace procedures
	1.2 Project deliverables and budget are identified from project planning and other relevant documentation and discussions with appropriate person/s
	1.3 Measurable outcomes are identified from project

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		planning and other relevant documentation to evaluate the project on completion
	1.4	Plant, materials and skills required to achieve project outcome/s are identified from project planning and other relevant documentation
	1.5	Processes and procedures are developed for managing contract variations from discussions with relevant person/s and in accordance with contractual agreement
2 Manage RE project	**2.1**	WHS/OHS policies, procedures and programs are implemented and monitored
	2.2	Project tasks/outcomes are delegated to project personnel with required competence
	2.3	Project risks are identified and strategies implemented to ensure outcomes achieved are in accordance with quality standards specified in the contract, safety requirements and workplace policies and procedures
	2.4	Procurement processes and procedures are monitored to ensure on-time supply of plant and materials and in accordance with workplace policies
	2.5	Project progress is monitored against schedule, quality requirements and budget
	2.6	Conflicts at worksite and between stakeholders, clients and regulators are identified and managed in accordance with workplace policies
	2.7	Variations are managed in accordance with agreed processes and in accordance with the contract
	2.8	Project records are maintained and progress reports written and provided to relevant person/s
3 Complete RE project	**3.1**	Project outcomes are reviewed against original plan, implemented risk strategies, contract variations, safety record and budget
	3.2	Project completion acceptance is sought from appropriate person/s and handover documented in accordance with workplace policies

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Managing a RE project must include:	• an industry accepted medium-sized RE project

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK121A Manage renewable energy (RE) projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0042 Manage renewable energy (RE) projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- establishing the scope of the project accurately
- ascertaining the input of a project
- developing effective management processes
- managing resources and variations effectively
- resolving conflicts
- adopting risk management strategies
- maintaining records and submitting progress reports
- meeting project outcomes
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- completing and handing over project
- developing and applying relevant hazard identification, risk assessment, relevant control measures and reporting.
-

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- renewable energy (RE) project management, including:
  - project management encompassing:
    - defining project parameters: project scope, project stakeholders and clients, project phases and the relationship between phases, time requirements and limitations, resource requirements and limitations, quality requirements and limitations
    - time management: time-management concepts and standard practices for ensuring a

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project runs to time
    - financial management: financial management concepts; standard practices for managing project finances; project budget, costs, variations and estimations; invoicing against project phases/deliverables; and acquittals
    - quality management: quality management concepts and standard practices for managing quality within a project
    - human resource management: human resource management concepts and standard practices for managing personnel within a project
    - communication management: communication management concepts and standard practices for managing communication within a project
    - risk management and contingencies: risk management concepts, standard practices for managing risk within a project, internal risks, external risks, risk minimisation, risk removal and contingencies
    - procurement management: procurement management concepts and standard practices for managing procurement
    - physical resource management: types of physical resources, including:
        - equipment, technology, information, facilities, physical resource management concepts and standard practices for managing physical resources
    - contracts: understanding project contracts, standard practices for working to contract specifications, contract format, contract content, legal obligations of contract parties, and accompanying documentation, including:
        - contract schedules
    - performance assessment and continuous improvement: standard performance assessment practices and standard continuous improvement practices
    - engineering ethics principles
- customer/client relations encompassing:
    - importance of customer/client relations
    - interpersonal skills that enhance customer/client
    - dispute resolution
    - customer/client relations strategies
- RE industry sector customs and practices encompassing:
    - technical aspects of project planning and management:
        - method of ensuring equipment meets specified performance requirements
        - performance/cost-benefit analysis
        - equipment procurement
        - typical approaches to planning and management
        - successful planning techniques
        - best practice management methods and styles
- WHS/OHS and enterprise responsibilities encompassing:
    - provisions of relevant WHS/OHS legislation
    - principles and practices of effective WHS/OHS management
    - management arrangements relating to regulatory compliance

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    - enterprise hazards and risks, control measures and relevant expertise required
    - characteristics and composition of workforce and their impact on WHS/OHS management
    - relevance of enterprise management systems to WHS/OHS management
    - analysis of working environment and design of appropriate WHS/OHS management systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assessment of resources to establish and maintain WHS/OHS management systems
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to managing RE projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0043 Plan periodic maintenance schedules of remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan periodic maintenance schedules of remote area power supplies (RAPS).

It includes establishing maintenance requirements, developing and implementing maintenance schedule, and evaluating maintenance program.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEERE0023 Work safely with remote area power supply systems

UEERE0006 Conduct periodic maintenance of remote area power supply battery banks

UEERE0007 Conduct periodic maintenance of remote area power supply generator sets

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Establish RAPS system maintenance requirements**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures, skills required and frequency and level of maintenance work are determined in accordance with maintenance routines and workplace procedures
		1.2 Records are created to manage maintenance work and updated in accordance with workplace procedures
		1.3 Maintenance and replacement or repair work are determined in accordance with manufacturer and community requirements and workplace procedures
		1.4 Maintenance program, including basic periodic instruction in demand side use, is determined in accordance with local community requirements and workplace procedures
2	**Develop and implement RAPS system maintenance schedule**	**2.1** Maintenance schedules are developed from equipment manufacturer recommendations and in accordance with RAPS system safety and performance requirements
		2.2 Procedures are developed and implemented to ensure the maintenance program is completed in accordance with the planned schedule and requirements
		2.3 Procedures are developed and implemented to ensure records are maintained in accordance with planned schedule and requirements
3	**Evaluate RAPS system maintenance program**	**3.1** Periodic and sample inspection reports are used to determine maintenance quality and the need for revision of maintenance schedule and frequency
		3.2 Maintenance schedule is periodically reviewed and revised to maintain the integrity of the RAPS system

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK108A Plan periodic maintenance schedules of remote area power supplies (RAPS).

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0043 Plan periodic maintenance schedules of remote area power supplies (RAPS)

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- completing maintenance schedule reporting and record keeping
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- developing a plan for periodic maintenance of remote area power supply (RAPS) systems located in different communities, including the following:
  - items to be check and tested
  - items to be replaced or repaired
  - frequency of the periodic maintenance
  - required materials and equipment
  - timeframes to conduct maintenance on each RAPS system
  - travel distance and times to each community
  - periodic and sample inspection reports
  - protocols for working in different communities
  - methods for recording and evaluating maintenance
  - periodic review and revision of RAPS system maintenance schedule.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- development and self-management of simple maintenance programs
- maintenance scheduling principles, including:
  - limitation of the role of the RAPS service worker
  - periodic maintenance planning procedures

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  - development of vehicle booking procedures
  - development of checklists for replacement equipment
  - determining items to be checked
  - determining items to be replaced
  - development procedures for recording and reporting
  - scheduling of maintenance at multiple communities
  - developing checklists for preparation of service, vehicle and tools and equipment
  - developing processes for sourcing and funding replacement components
- plant maintenance planning
- relevant RAPS system manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- reporting of maintenance work.
- techniques to develop and implement RAPS system maintenance schedule.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate maintenance materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to developing a plan for periodic maintenance of RAPS systems located in different communities
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals
- maintenance equipment for RAPS system, including:
  - battery bank
  - engine driven generator sets

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- fuel storage
- inverter and regulator
- photovoltaic (PV) array
- wind generators.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0044 Plan renewable energy (RE) projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to plan a renewable energy (RE) project.

It includes preparing to plan a project, developing a RE project plan proposal and obtaining approval for a project plan.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to plan project	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified, interpreted and applied in accordance with workplace procedures
	1.2 Relevant techniques for project planning are reviewed and applied in accordance with workplace policies

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		1.3	Scope of the project is determined from design brief specification and/or other relevant documentation and discussions with relevant person/s
2	**Develop RE project plan proposal**	**2.1**	Estimated plant, material, labour and other costs are obtained from relevant person/s in accordance with workplace policies and procedures
		2.2	Project budget is established from estimated plant, material, labour and other costs in accordance with workplace policies and procedures
		2.3	Critical path analysis is applied to developing workflow strategies
		2.4	Sources and availability of materials and human resources for the project are identified in accordance with workplace policies and procedures
		2.5	Risk management strategies are identified, obtained and applied in the project plan
		2.6	Project plan is reviewed against all inputs and adjusted to rectify any anomalies
		2.7	Project plan proposal is documented in accordance with workplace policies and procedures
3	**Obtain approval for project plan**	**3.1**	Project plan is presented and discussed with relevant person/s
		3.2	Alterations to the project plan resulting from the presentation/discussion are negotiated with relevant person/s within constraints of workplace policies
		3.3	Final project plan is documented and approval obtained from relevant person/s

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK122A Plan renewable energy (RE) projects.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0044 Plan renewable energy (RE) projects

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- determining the project requirements accurately
- establishing a project budget
- developing effective workflow strategies
- documenting project plan proposal
- negotiating alterations to the proposed project plan successfully
- obtaining approval of the final plan
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- determining and applying relevant risk management strategies
- determining and sourcing material, equipment and human resource requirements
- determining project scope
- planning a medium-sized renewable energy (RE) industry project plan.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- RE project planning, including
  - project planning encompassing:
    - purpose of project planning
    - documents needed to plan a project
    - factors influencing sequence and restraints of project activities
  - critical path project analysis encompassing:
    - purpose of critical path analysis
    - essential data
    - relational sequence of work activities

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    - graphical representation methods
    - methods of representing time/rates
    - monitoring methods
- RE industry sector customs and practices encompassing:
    - technical aspects of project planning and management:
        - method of ensuring equipment meets specified performance requirements
        - performance/cost-benefit analysis
        - equipment procurement
        - typical approaches to planning and management
        - successful planning techniques
        - best practice management methods and styles
- WHS/OHS and enterprise responsibilities encompassing:
    - provisions of relevant WHS/OHS legislation
    - principles and practice of effective WHS/OHS management
    - management arrangements relating to regulatory compliance
    - enterprise hazards and risks, control measures and relevant expertise required
    - characteristics and composition of workforce and their impact on WHS/OHS management
    - relevance of enterprise management systems to WHS/OHS management
    - analysis of working environment and design of appropriate WHS/OHS management systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assessment of resources to establish and maintain WHS/OHS management systems
- human and physical resource management concepts
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to planning RE projects
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0045 Solve basic problems in micro-hydro systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve basic problems in micro-hydro systems.

It includes preparing to work on micro-hydro systems, solving problems in micro-hydro systems and completing work and documenting problem-solving activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Those holding an ‘Unrestricted Electrician’s Licence’ or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on micro-hydro systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
	1.3 Nature of the apparatus problem is obtained from documentation or from relevant person/s to determine the scope of work
	1.4 Instructions for coordinating work with others is obtained from relevant person/s and applied
	1.5 Materials required for the work are identified and accessed in accordance with workplace procedures
	1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2 Solve problems in micro-hydro systems	**2.1** Workplace risk control measures and procedures are applied
	2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.3 Circuits are isolated in accordance with WHS/OHS requirements and workplace procedures
	2.4 Micro-hydro problems are solved using measured and calculated values of apparatus operating parameters and in accordance with workplace procedures
	2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment and services applying sustainable energy practices
3 Complete work and document problem-solving	**3.1** Workplace risk control measures and procedures are applied

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activities

3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Justification for solutions used to solve micro-hydro problems is documented

3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Solving problems in micro-hydro systems must include at least the following:	• problems related to:
	  • installation
	  • fault finding
	  • maintenance or development work functions in relation to the following:
	  • determining the operating parameters of an existing apparatus/system
	  • identifying and locating electrical faults
	  • identifying and locating mechanical faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK124A Solve basic problems in micro hydro systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0045 Solve basic problems in micro-hydro systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the nature of the problem
- using established routines to solve apparatus/system problems
- providing viable solutions to apparatus/system problems
- documenting justification for the solutions used
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- micro-hydro systems, including:
  - system components and configuration encompassing:
    - structural differences between the Pelton, turbo impulse, Francis and propeller type, Michell or Banki cross-flow turbines and Pumps as Turbines (PATs)
    - system configuration for each turbine type identifying all major components
    - for impulse and cross-flow turbine types, the comparison of bucket and blade shapes, nozzle shapes and types, types of hydraulic and electrical controllers/governors, speed increasers and over speed clutches and their basic operation and appropriate application

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    - operational parameters and efficiency of different turbines
    - circumstances under which battery storage would be used
    - respective merits and suitability of various turbine types for various micro-hydroelectric applications
    - operation of hydraulic rams or similar water pumps:
        - typical efficiencies of hydraulic ram systems and appropriate applications
    - advantages and disadvantages of water energy storage systems with other energy storage systems, such as battery banks
- micro-hydro systems standards encompassing:
    - relevant Australian Standards AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), AS/NZS 4509 Stand-alone power systems and AS 4086.2 Secondary batteries for use with stand-alone power systems - Installation and maintenance associated with the installation, maintenance and operation of micro-hydro small-scale generation units
- micro-hydro systems drawings encompassing:
    - schematic and wiring diagrams for the micro-hydro system showing the general circuit layout and protection between the micro-hydro system, batteries, inverter and loads
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to solving basic problems in

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micro-hydro systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0046 Solve problems in stand-alone renewable energy (RE) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in stand-alone renewable energy (RE) systems.

It includes preparing to work on stand-alone RE systems, solving problems in stand-alone RE systems, completing work and documenting problem-solving activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0025 Carry out basic repairs to renewable energy apparatus

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to work on stand-alone RE systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 Risk control measures are applied in accordance with

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		workplace procedures prior to commencing work
		1.3 Nature of the apparatus problem is identified from documentation or from relevant person/s to determine the scope of work
		1.4 Instructions for coordinating work with others is obtained from relevant person/s and applied
		1.5 Materials required for the work are identified and accessed in accordance with workplace procedures
		1.6 Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	**Undertake problem solving in stand-alone RE systems**	**2.1** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
		2.2 Circuits are isolated in accordance with WHS/OHS requirements and workplace procedures
		2.3 Stand-alone RE system problems are solved using measured and calculated values of apparatus operating parameters and in accordance with workplace procedures
		2.4 Problems are solved without damage to apparatus, circuits, the surrounding environment and services applying sustainable energy practices
3	**Complete work and document problem-solving activities**	**3.1** Worksite is cleaned and made safe in accordance with workplace procedures
		3.2 Justification for solutions used to solve stand-alone RE systems problems is documented
		3.3 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

RE system problem solving must include at least three of the following problems:

- open circuit
- short circuit
- incorrect connections
- insulation failure
- unsafe condition
- apparatus/component failure
- related mechanical failure

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK128A Solve problems in stand-alone renewable energy systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0046 Solve problems in stand-alone renewable energy (RE) systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the nature of the problem
- using established routines to solve apparatus problems
- providing viable solutions to apparatus problems
- documenting justification for the solutions used
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- stand-alone renewable energy (RE) system components, including:
  - extra-low voltage (ELV) wiring and circuit protection for RE systems encompassing:
    - ELV and low voltage (LV) circuits in a stand-alone or grid connected RE system and the regulatory restrictions regarding work at each level
    - earthing requirements for RE systems over a range of applications and environments
    - required sizes for ELV cabling in a RE system, considering allowable voltage drops and cable current-carrying capacity, in accordance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and AS/NZS 4509 Stand-alone power systems

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  - selection of suitable direct current (d.c.) circuit protection and isolation for all relevant points in a stand-alone RE system in accordance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) and AS/NZS 4509 Stand-alone power systems
- electrical diagrams for a RE system encompassing:
  - functional block diagrams for typical stand-alone RE system configurations
  - circuit schematic of typical RE systems supplying d.c. and/or alternating current (a.c.) loads, including all major components, protection devices, earthing, isolation, switching and metering
  - unit wiring diagram for a typical stand-alone RE system d.c. control board
  - architectural and site diagrams to show the locations of equipment, fittings and cabling
- batteries encompassing:
  - major features of each of the major types of commercially available batteries for stand-alone RE applications, including basic chemistry, physical structure, advantages and disadvantages
  - factors affecting the life of a battery
  - processes of sulphation and stratification in lead-acid batteries, their causes, effects and methods of prevention or reduction
  - effect of depth of discharge and of temperature on the capacity and life of lead-acid batteries
  - major specifications for a lead-acid battery in a stand-alone RE system application
  - main features of charging regimes suitable for the major types of stand-alone RE system batteries, using real examples
  - life of a stand-alone RE system battery in years, based on manufacturer's cycle life data and given capacity, configuration and operating conditions
  - precautions required when handling, installing or maintaining lead-acid batteries
  - procedures required for safe disposal of the major commercially available types of batteries in accordance with AS/NZS 4509 Stand-alone power systems
- balance of system components and common loads encompassing:
  - features of commercially available inverters suitable for use in stand-alone RE systems
  - major operating parameters of an inverter, including d.c. voltage operating window, efficiency, output voltage waveform and output voltage regulation over a range of loads up to 5-minute ratings
  - problems that may be caused by non-sine supply voltage waveforms on typical loads, and the solutions used to overcome these
  - significance of low power factor loads for inverter systems and the principle of power factor correction
  - operation of the major types of regulators for use in stand-alone RE systems using commercially available equipment as examples
  - current vs. voltage characteristics, efficiency and charging voltage waveform for a transformer/rectifier type and a switch mode type battery charger suitable for use in

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stand-alone RE systems
    - operation of and applications for MPPTs for photovoltaic (PV) arrays
    - basic operation, advantages and disadvantages of mechanical tracking devices for PV arrays
    - control parameters or data using digital displays on inverters, regulators or controllers
- basic lighting design encompassing:
    - properties and features of the major lamp types, including their suitability for use in stand-alone RE power systems
    - effect on room lighting levels, of luminaire design and positioning, décor, room construction and windows
    - selection and sizing of suitable lamps and fittings and their placement in a household taking into account usage, lighting levels required by relevant standards and energy efficiency considerations
- generating sets encompassing:
    - major components in the construction of a generating set
    - main components of gas, petrol or diesel internal combustion engines
    - basic principle of operation of internal combustion engines, including different fuel types and ignition methods
    - operating characteristics, advantages and disadvantages of generating sets using different fuel types, aspiration methods, operating speed and number of cylinders
    - major methods of mechanical coupling and power transmission between an engine and alternator
    - function and ratings of mechanical and electronic speed governing systems
    - basic structure and operation of an alternator
    - advantages and disadvantages of different types of excitation system and voltage regulation used for generating set alternators
    - components and basic operation of a brushless excitation system in an alternator, and the principle of self-excitation
- generator set sizing calculations encompassing:
    - major electrical and mechanical ratings which control the performance of a generator set
    - calculations relating to real and apparent power, power factor, mechanical power, voltage regulation and speed droop for single phase gensets
    - derating factor for a generator set given manufacturer’s derating data and a given set of operating conditions
    - selection of a suitable generator set given maximum demand and surge loadings and derating factor
    - calculation of the fuel consumption of a generator set given manufacturer’s data and operating conditions
- problem-solving techniques, including measuring and calculating value requirements
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation

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processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to solving basic problems in stand-alone RE systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0047 Solve problems in wind energy conversion systems (WECS) rated up to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to solve problems in wind energy conversion systems (WECS) rated up to 10 kilowatt (kW).

It includes preparing to work on WECS, solving problems in WECS, completing work and documenting problem-solving activities.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.
1	**Prepare to work on WECS**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
		1.2 Risk control measures are applied in accordance with workplace procedures prior to commencing work
		1.3 Nature of apparatus problem is identified from documentation or from relevant person/s to determine the scope of work
		1.4 Instructions for coordinating work with others is obtained from relevant person/s and applied
		1.5 Materials required for the work are identified and accessed in accordance with workplace procedures
		1.6 Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety
2	**Solve problem in WECS**	**2.1** Workplace risk control measures and procedures are applied
		2.2 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
		2.3 Circuits are isolated in accordance with WHS/OHS requirements and workplace procedures
		2.4 WECS problems are solved using measured and calculated values of apparatus operating parameters and in accordance with workplace procedures
		2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment and services using sustainable energy practices
3	**Complete work and document problem-solving activities**	**3.1** Workplace risk control measures and procedures are applied
		3.2 Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Justification for solutions used to solve WECS problems is documented

3.4 Work completion is documented and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Problem solving in WECS must include the following:	• installation, fault-finding, maintenance or development work functions on at least three of the following:
	  • determining the operating parameters of an existing apparatus
	  • identifying and locating electrical faults
	  • identifying and locating mechanical faults

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK130A Solve problems in wind energy conversion systems rated up to 10 kW.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0047 Solve problems in wind energy conversion systems (WECS) rated up to 10 kW

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the nature of the problem
- using established routines to solve apparatus problems
- providing viable solutions to apparatus problems
- documenting justification for the solutions used
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- identifying and accessing materials, tools, equipment and testing devices
- solving problems in wind energy conversion systems (WECS).

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- types, construction and operating features of small WECS, construction and operating features to the extent indicated by the following aspects:
  - basic operation of lift and drag type WECS
  - characteristics of WECS in terms of power and torque, efficiency (power and output co-efficient), solidity and tip speed ratio
  - major categories and sub-categories of WECS
  - advantages and disadvantages of each type of WECS
  - suitable materials for the construction of WECS taking into consideration fatigue stresses

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and environmental conditions such as salt air, humidity and ice
- typical system configurations and components for stand-alone power systems and water pumping
- strategies and/or mechanisms to control mechanical stresses on the WECS in gale force winds and power output for battery charging
- appropriate types of WECS for a particular application
- problem-solving techniques
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures encompassing:
  - power output for battery charging
  - water pumping.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to solving problems in WECS
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0048 Verify compliance and functionality of an extra-low voltage renewable energy installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to verify compliance and functionality of an extra-low voltage (ELV) renewable energy (RE) installation.

It includes preparing to inspect and test a RE installation, visually inspecting and conducting safety testing on the installation, and reporting inspection and test findings.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuit

UEECD0045 Solve problems in multiple path extra low voltage (ELV) a.c. circuits

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in electromagnetic devices

UEERE0025 Carry out basic repairs to renewable energy apparatus

UEERE0034 Diagnose and rectify faults in renewable energy control systems

UEERE0046 Solve problems in stand-alone renewable energy systems

UEERE0035 Install ELV stand-alone photovoltaic power systems

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

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UEECD0046 Solve problems in single path circuits

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test a RE installation	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for relevant work area are identified and applied in accordance with workplace procedures
	1.2 WHS/OHS hazards are identified, risks assessed, reported to relevant person/s and workplace procedures for risk control measures applied in preparation for work
	1.3 Relevant documentation and/or industry standards are reviewed and interpreted
	1.4 Relevant person/s is consulted to ensure the work is coordinated effectively with others
	1.5 Tools, equipment and testing devices required to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.6 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements
2 Visually inspect and conduct safety testing on the RE installation	**2.1** Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace procedures
	2.2 Circuits/machines/plant are isolated in accordance with WHS/OHS requirements and workplace procedures

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	2.3	Suitability of wiring is checked for the environment/s in which they are installed and protected from damage or overheating
	2.4	Cable conductor sizes that meet current-carrying capacity requirements and voltage-drop are acquired
	2.5	Protection methods and devices are validated as meeting coordination requirements for overload and short circuit protection
	2.6	Switchgear and control gear are validated as correctly rated and appropriate for functional requirements
	2.7	Evidence that electrical equipment complies with safety requirements is cited
	2.8	Correct location of earthing system and size of conductors is checked
	2.9	Markings on switchboards are checked for accuracy, clarity and compliance with requirements
	2.10	Visual inspection is conducted to ensure that system complies with requirements
	2.11	Testing is conducted to verify that circuit connections are correct, voltage drop is within limits, circuit protection operates as intended, polarities are correct, and charging rates are compliant with specifications
3 Report inspection and test findings	**3.1**	Worksite is cleaned and made safe in accordance with workplace procedures
	3.2	Non-compliance defects are identified and reported in accordance with workplace procedures
	3.3	Recommendations for rectifying defects are made in accordance with workplace procedures
	3.4	Documentation is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Verifying compliance and functionality of an ELV RE installation must include at least the following:

- two electrical installations comprising:
  - a photovoltaic (PV) array of at least 450 watts
  - a battery bank
  - an inverter
  - a battery charger (or inverter/charger)
  - a generating set

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK149A Verify compliance and functionality of a extra low voltage renewable energy installation.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0048 Verify compliance and functionality of an extra-low voltage renewable energy installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- selecting correct tools and testing equipment
- identifying visual non-compliance defects
- using effective methods for conducting tests
- identifying non-compliance from test results
- identifying causes of non-compliance
- completing mandatory reporting
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- applying sustainable energy principles and practices
- checking isolation of circuits/machines/systems
- coordinating work with relevant person/s
- determining live electrical testing/measurement requirements
- verifying compliance and functionality of extra-low voltage (ELV) renewable energy (RE) installations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- RE installations and ELV installation requirements encompassing:
  - requirements for installation of wiring and equipment
  - compliant methods for providing protection
  - requirements for installation planning and selection of equipment
  - testing and verification requirements
  - documentation encompassing:

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    - results of tests conducted that comply with requirements and ensure the ELV RE installation is safe, including any formal documents of the results of testing required by authorities
    - documents of periodic inspection and testing of ELV RE wiring and equipment, including any tagging, in accordance with requirements
- energy efficient building design
- relevant RE manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0049 Apply safe work practices in the rooftop solar industry

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to apply safe work practices in the rooftop solar industry.

It includes identifying health and safety legislation, regulations, standards, codes of practice and workplace requirements and their application to relevant workplace tasks.

It also includes working safely at heights, safe manual handling of solar components, asbestos and silica awareness.

Work is performed by teams of two or more persons to install and repair domestic or commercial solar rooftop systems.

The application of the skills and knowledge described in this unit may require a licence, registration or certification to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Not Applicable

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to apply safe practices	**1.1** Legislation, regulations, standards, codes of practice and workplace requirements for the worksite are identified and referred to
	1.2 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.3 Hazards are identified, risks assessed and control measures identified in accordance with workplace and regulatory requirements
	1.4 Worksite is prepared to minimise risk in accordance with workplace and regulatory requirements
2 Apply safe practices	**2.1** Legislation, regulations, standards, codes of practice and workplace requirements for the work to be performed are applied and monitored
	2.2 Manual handling is carried out in accordance with workplace and regulatory requirements
	2.3 Plant, tools, equipment and PPE are used in accordance with manufacturer, workplace and regulatory requirements
	2.4 Working at heights is carried out in accordance with workplace and regulatory requirements
	2.5 Hazard control measures are applied and monitored in accordance with workplace and regulatory requirements
	2.6 Worksite is maintained to minimise risk in accordance with workplace requirements
	2.7 Hazards identified during the work are assessed and controlled in accordance with workplace and regulatory requirements
	2.8 Incidents and emergencies are responded to in accordance with workplace and regulatory requirements
3 Complete work and documentation	**3.1** Worksite is rehabilitated, cleaned and made safe in accordance with workplace and regulatory requirements
	3.2 Plant, tools and equipment are cleaned, checked and returned in accordance with workplace requirements

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3.3 Work records, reports and documentation are completed in accordance with workplace and regulatory requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

Newly created unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0049 Apply safe work practices in the rooftop solar industry

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and workplace requirements including:
  - work health and safety (WHS)/occupational health and safety (OHS)
  - working at heights
  - manual handling
- identifying typical hazards within the solar industry
- inspecting worksite to determine layout and physical condition of rooftop structures
- applying and reviewing risk control measures to minimise, control or eliminate identified hazards
- monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- applying workplace procedures for an emergency
- using plant, tools and equipment safely
- applying correct manual handling techniques
- applying current working at heights requirements for the solar industry
- completing relevant work records, reports and documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations standards, codes of practice and workplace requirements including:
  - WHS/OHS
  - manual handling in the solar industry
  - working at heights in the solar industry
- identifying hazards, assessing risks, and identifying, applying and monitoring control measures in the solar industry

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- regulations for working in the vicinity of overhead supplies
- types of manual handling equipment in the solar industry
- working at heights practices in the solar industry including:
  - passive fall prevention systems
  - work positioning systems
  - fall arrest systems
  - clearances to other services
  - layout and physical condition of rooftop structures
- types, inspection and application of PPE
- safe use of plant, tools and equipment including:
  - pre-operational checks
  - post-operational checks
- types of injuries common in the solar industry
- emergency and rescue plan
- asbestos, including:
  - common types of asbestos containing building materials
  - warning signs used to identify the presence of asbestos
  - effects of asbestos on the human body
  - requirements for reporting the presence of asbestos
- silica, including:
  - types of materials that contain crystalline silica (silica dust)
  - methods of releasing silica dust
  - recommended levels of exposure to crystalline silica
  - effects of crystalline silica on the human body
- working safely with electricity, including:
  - hazards of direct current (d.c.) and alternating current (a.c.) electricity
  - effects of electric shock on the body
  - precautions to minimise the chance of electric shock
  - common causes of electrical accidents
  - procedures for emergency involving electricity.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic

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and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE0050 Identify and isolate multiple supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to identify and isolate multiple supply systems.

It includes identifying locations of multiple supply systems within a premise with or without grid supply, performing shutdown and isolation procedures and returning supply systems to normal operations.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian state or territory meet the prerequisite requirements of this unit.

Pre-requisite Unit

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to isolate multiple supply systems	**1.1** Legislation, regulations, standards, codes of practice and workplace requirements for the worksite are identified and referred to
	1.2 Scope of work is determined, implications of isolation/s are identified
	1.3 Site specific information including manuals, drawings, operational information, labelling, shutdown and start up procedures are identified and referred to
	1.4 Worksite is assessed in accordance with workplace requirements
	1.5 Hazards are identified, risks assessed and control measures identified and applied
	1.6 Tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
	1.7 Circuit testing devices are obtained and checked for correct operation and safety in accordance with workplace requirements
	1.8 Relevant person/s are notified of supply systems shutdown and isolation in accordance with workplace requirements
2 Isolate multiple supply systems	**2.1** Supply systems shutdown procedures are completed in accordance with site specific information and workplace requirements
	2.2 Supply systems circuits are tested and confirmed as de-energised and lock-out procedures followed
3 Re-instate multiple supply systems	**3.1** Supply systems start up procedures are completed in accordance with site specific information and workplace requirements
	3.2 Supply systems are confirmed as re-energised and tested for correct operation
	3.3 Incidents or unplanned events are responded to in accordance with workplace requirements
	3.4 Relevant person/s are notified of re-instatement of supply systems in accordance with workplace

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requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

Newly created unit.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE0050 Identify and isolate multiple supply systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- applying relevant legislation, regulations, standards, codes of practice and workplace requirements including:
  - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- assessing worksite including:
  - locating switchboard/s and circuits
  - locating and interpreting site specific information
  - locating inverter energy systems (IES) and supply systems
  - applying awareness of unidentifiable supply systems
  - identifying and locating isolation devices
  - identifying and locating supply systems conductors
- shutting down and isolating supply systems for at least two (2) of the following:
  - renewable energy IES
  - grid connected IES with stand-alone functionality
  - stand-alone IES
  - engine driven
- returning supply systems to normal operation for at least two (2) of the following:
  - renewable energy IES
  - grid connected IES with stand-alone functionality
  - stand-alone IES
  - engine driven
- isolating multiple supply systems in accordance with workplace and regulatory requirements, including:
  - applying safe isolation practices
  - identifying correct isolation device/s
  - identifying live conductors
  - correctly using testing equipment

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  - confirming systems are isolated
  - tagging-out all supplies
- testing re-energised supply systems for correct operation and electrical safety
- confirming documented shutdown and start up procedures are correct including:
  - notifying appropriate person/s of any inconsistencies in the procedures
- dealing with an unplanned event.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and workplace requirements including:
  - WHS/OHS
- hazard, risk assessment and risk control requirements including potential hazards
- potential injuries caused by multiple supply systems
- notification to relevant person/s of shutting down and starting up supply systems
- safe use of tools and equipment including:
  - testing equipment
- electrical isolation including:
  - anti-islanding
  - unidentifiable supply systems
  - need for ensuring the safe isolation of an electrical supply
  - isolation devices used in IES
  - tagging and lockout
  - central protection systems
- characteristics, operations and safety functions of multiple supply systems including:
  - renewable energy IES
  - grid connected IES with stand-alone functionality
  - stand-alone IES
  - engine driven
- types and location of labelling for multiple supply systems
- site specific information including:
  - operational information
  - manuals
  - drawings
  - labelling
  - shutdown procedures and start up procedures
  - notification of inconsistencies in shutdown and start up procedures
- working safely with electricity including:

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- hazards of direct current (d.c.) and alternating current (a.c.) electricity
- effects of electric shock on the body
- precautions to minimise the chance of electric shock
- procedures for emergency involving electricity
- common causes of electrical accidents.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations, where it is appropriate to do so.

Where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, relevant industry standards, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE4001 Install, maintain and fault find battery storage systems for grid-connected photovoltaic systems

Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to safely and effectively install, maintain and fault find battery storage systems for grid-connected photovoltaic (PV) systems.

A person competent in this unit will hold an unrestricted electrical licence issued in an Australian State or Territory and be able to install, maintain and fault find battery storage systems for grid-connected PV in accordance to relevant industry standards and regulations.

This unit is subject to the following requirements:

- Legislation, regulations, relevant industry standards and codes of practice for electrical work including specific work health and safety (WHS)/occupational health and safety (OHS) legislation and regulatory requirements
- Electrical licencing requirements – unrestricted electrical work
- Legislation, regulations, relevant industry standards and codes of practice for renewable energy.

There may be variations in these requirements across jurisdictions.

Pre-requisite Unit

UEENEEK148A Install, configure and commission LV grid connected photovoltaic power systems

Competency Field

Renewable and Sustainable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

Elements describe the essential Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Plan for the installation, maintenance or fault finding of battery storage systems for grid-connected PV systems	**1.1** Installation design requirements, components and how they interconnect with the different system configurations are identified
	1.2 Hazards associated with battery storage systems for grid-connected PV systems are identified and the risk control measures are listed in safe work method statements/job safety analysis
	1.3 Designer recommendations, relevant industry standards, regulations and manufacturer specifications are identified and applied to planning the system installation, maintenance or fault finding
	1.4 Tools and safety equipment are selected and checked for safe performance of required tasks
	1.5 Maintenance is planned in accordance with system designer's requirements
	1.6 PV system and reported faults are identified and fault finding techniques applied
2 Carry out the installation, maintenance and fault finding of battery storage systems for grid-connected PV systems	**2.1** Job safety analysis is undertaken or safe work method statement is prepared and used to inform work processes in accordance with regulations and workplace procedures
	2.2 Battery storage components are installed in accordance with system design documentation, relevant industry standards, regulations and manufacturer specifications
	2.3 Inverters are installed in accordance with system design documentation, relevant industry standards, regulations and manufacturer specifications
	2.4 System charge controllers are installed in accordance with system design documentation, relevant industry standards, regulations and manufacturer specifications
	2.5 Storage system equipment including, cables, protection and isolation equipment, and signs are installed in accordance with system design documentation, relevant industry standards,

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	regulations and manufacturer specifications
	2.6 System charge controllers and inverters are programmed in accordance with design documentation, relevant industry standards, regulations and manufacturer specifications
	2.7 Required modification to the electrical installation is carried out in accordance with design documentation, regulations and relevant industry standards
	2.8 Maintenance checklists are used to identify items needing servicing or replacement
	2.9 Required maintenance is performed by servicing or replacing items
	2.10 Fault finding techniques are applied to correctly diagnose and rectify system faults
	2.11 Testing, commissioning or reinstatement of the system is conducted in accordance with design documentation, regulations, relevant industry standards and manufacturer specifications
3 Document the installation, maintenance or fault finding of battery storage systems for grid-connected PV systems	**3.1** Testing, commissioning and required compliance documents are completed
	3.2 As installed, electrical system drawings and equipment location plans are produced
	3.3 Client system documentation, from designer, is completed
	3.4 Client is briefed on safe and correct system operation and recommended maintenance
	3.5 Maintenance checklists are finalised correctly and added to client system documentation
	3.6 Fault report/record is completed and added to client system documentation

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit – no equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERE4001 Install, maintain and fault find battery storage systems for grid-connected photovoltaic systems

Modification History

Not applicable.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- documenting the battery storage system installation for the client:
  - plan and enact scheduled maintenance of a system
  - document/record maintenance activities
- finding faults in battery storage systems for grid-connected photovoltaic (PV) system:
  - plan and enact identified fault finding procedures for the installed system
  - document/record fault finding activities
- installing battery storage systems for grid-connected PV systems:
  - install battery storage components
  - install inverter/s
  - install charge controller/s
  - install the balance of system equipment including cables, protection and isolating devices, and signage
  - program inverter/s and charge controller/s
  - modify electrical installation as required
- maintaining battery storage systems for grid-connected PV systems
- preparing for the installation of a battery storage system:
  - interpret system design documentation that specifies the quantity and location of all equipment in compliance with relevant industry standards, building codes and regulations
- testing and commissioning PV system:
  - test operation of each piece of equipment
  - test operation of complete system
  - commission the system
  - brief client on safe and correct system operation and recommended maintenance
- undertaking site assessment:

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- interpret system design documentation that specifies the quantity and location of all equipment in compliance with relevant industry standards, building codes and regulations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- battery storage systems:
  - battery storage systems for grid-connected PV systems including:
    - applications for battery storage including:
      - electrical energy supply during grid outages
      - electrical energy supply direct to loads during periods of high tariffs
  - purpose of each component in battery storage systems for grid-connected PV systems
  - functional block diagrams for typical configurations of battery storage systems for grid-connected PV systems including:
    - multimode inverter/s for connecting to renewable energy, grid, loads and battery storage; these inverter/s provide backup to dedicated loads on grid failure and may:
      - have a built in charge controller for direct connection of a PV array or
      - require a separate charge controller to direct current (DC) couple the PV array and battery
    - two types of inverters comprising, PV grid-connected inverter/s and multimode inverter/s where:
      - both inverter types are connected to the grid and loads via a switching device that may provide backup to dedicated loads during grid failure
      - both inverter types are connected to the grid and only the multimode inverter/s may provide backup to dedicated loads on grid failure
      - only the multimode inverter/s are connected to the grid. The grid-connected inverter/s are alternate current (AC) coupled to the multimode inverter/s and both types can provide backup to dedicated loads on grid failure
- charge controllers including:
  - types and applications of charge controllers for different system configuration
  - specifications of a charge controller, including:
    - output rating DC voltage operating window and/or rating

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        - DC current rating in and out
        - efficiency
- grid-connected batteries:
    - battery terms including:
        - nominal voltage
        - cell
        - primary and secondary cells
        - battery
        - charge and discharge rate
        - amp hour capacity
        - watt hour capacity
        - state of charge (SOC)
        - depth of discharge (DOD)
    - battery types including:
        - major features of commercially available types of batteries suitable for battery storage systems for grid-connected PV systems
        - factors affecting the life of commercially available types of batteries including the estimation of battery life
        - charging regimes suitable for commercially available types of batteries
    - battery safety including:
        - hazards associated with handling, installing or maintaining commercially available types of batteries and risk control measures
        - procedures for safe disposal of commercially available types of batteries
    - common processes leading to battery failure in commercially available batteries including sulphation and stratification in lead acid batteries
- grid-connected inverters:
    - inverters including:
        - differences between multimode and grid connect inverters
        - output rating of a multimode inverter/s in relation to:
            - required maximum demand
            - capacity for battery charging
        - program parameters for a multimode inverter, for the correct operation of the system
- grid-connected storage systems fault finding:
    - fault finding procedures including:
        - fault finding procedures for individual equipment
        - fault finding procedures for interconnected systems
- grid-connected storage systems installations:
    - installation requirements including:

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    - installing battery storage devices in accordance with system design documentation, relevant industry standards, regulations and manufacturer requirements
    - installing inverters suitable for connecting to battery storage in accordance with system design documentation, relevant industry standards, regulations and manufacturer requirements
    - installing charge controllers in accordance with system design documentation, relevant industry standards, regulations and manufacturer requirements
    - installing all balance of system equipment in accordance with system design documentation, relevant industry standards, regulations and manufacturer requirements
  - electrical drawings including:
    - electrical systems circuit diagrams of typical battery storage systems for grid-connected PV systems including:
      - AC loads being supplied during periods when grid is unavailable
      - all major components
      - protection devices
      - earthing
      - isolation
      - switching
      - metering
    - equipment location plan/s to show the locations of equipment, fittings and cabling
- grid-connected storage systems maintenance procedures including:
  - maintenance requirements for individual equipment
  - maintenance requirements for interconnected systems
- grid-connected storage systems testing and commissioning procedures including:
  - safe testing of equipment
  - safe testing of system operation
  - commissioning of battery storage system.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations, current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations, current at the time of assessment.

Assessment must occur in workplace operational situations where it is

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appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

Industry Standards

- relevant industry standards
- relevant industry product standards
- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)

Documentation including reporting formats

- manufacturer technical data site plans
- system designer documentation relevant to installing the system
- maintenance checklists and/or testing and commissioning sheet

Measuring and testing equipment

- multimeter insulation resistance tester clamp tester (DC and AC)

Plant

- an existing installed PV array along with the equipment to facilitate the installation of a battery storage system for grid-connected PV systems. This equipment shall comprise:
    - battery storage
    - multi-mode inverter/s
    - devices for interconnecting solar to system either including charge controller or an appropriate inverter and all required balance of system equipment including:
        - cables
        - protection and isolating devices
        - isolators and signage in accordance with relevant industry standards, regulations and industry guidelines
- appropriate switchboard (or similar) to simulate interconnection of the system with an existing electrical installation

Safety systems and personal protective equipment (PPE)

- example of a job safety analysis or safe work method statement form relevant for the practical installation; PPE related to the types of battery storage included in the system

Software/Systems

- programming software for the inverter/s and charge controller/s

Specialist requirements

- specific manufacturer specifications for the equipment included in the battery storage system for grid-connected PV systems including:

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    - installation manuals and user guides for typical components and those provided for the practical installation
- special tools as required for installing specific equipment
- special testing tools or equipment required for testing and commissioning, maintenance and fault finding of specific equipment

Tools and equipment

- hand tools and power tools.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERE5001 Design battery storage systems for grid-connected photovoltaic systems

Modification History

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to design battery storage systems for grid-connected photovoltaic (PV) systems.

This unit applies to a person with a sound knowledge of the components and different system configurations of battery storage systems for grid-connected PV systems and suitable energy management strategies that can be applied to the site where a system can be installed.

A person competent in this unit will be able to design a system, which includes calculating and selecting the correct sized equipment so the system output performance meets the client specific requirements within the guidelines of relevant industry standards, regulations and manufacturer requirements.

The unit involves designing a system taking into consideration all necessary work health and safety requirements relevant for the selected system and documenting the design including all calculations, equipment specifications and layouts.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEENEEK135A Design grid connected photovoltaic power supply systems

Competency Field

Renewable and Sustainable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Plan the design of battery storage systems for grid-connected photovoltaic systems**	**1.1** Available components are identified and the different system configurations are applied to system design planning
		1.2 Hazards associated with battery storage systems for grid-connected PV systems are determined and appropriate risk control measures are developed
		1.3 Electrical load/s to be supplied from the battery storage system are identified
		1.4 Energy assessments are undertaken using appropriate tools including data logging tools and/or energy assessment forms
		1.5 Site is assessed to determine feasibility, equipment location and any required switchboard modification
		1.6 Energy management strategies are applied to produce an energy management plan
		1.7 Relevant industry standards, building codes, regulations and manufacturer requirements are applied to system design planning
		1.8 Relevant electricity tariffs are incorporated in the system design
		1.9 Solar resource data is applied in the system design
		1.10 Client situation, budget and desired outcomes are incorporated in the system design
2	**Design battery storage systems for grid-connected photovoltaic systems**	**2.1** Suitable system configurations are selected to meet client requirements
		2.2 System efficiencies are applied to system designs and overall system yield for different system configurations is determined
		2.3 Type and capacity of inverter/s to meet performance requirements are determined
		2.4 Type and capacity of battery storage to meet performance requirements are determined
		2.5 Type and capacity of charge controller/s to meet performance requirements are determined

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	2.6	Capacity of PV array to meet performance requirements is determined
	2.7	Merits of alternate configurations including maintenance requirements are analysed and the most appropriate system design is selected
	2.8	Location of each item of equipment is determined
	2.9	Size of cables and ratings of protection and isolations devices are determined
3 Document the design of battery storage systems for grid-connected photovoltaic systems	**3.1**	Identified hazards are listed and appropriate risk control methods are specified
	3.2	Required items of equipment and system components are identified and listed
	3.3	System operating parameters are specified
	3.4	Electrical systems schematic/s and equipment location plan/s, inclusive of signage, are produced
	3.5	System cost and performance are documented
	3.6	Maintenance, client and installer documentation are produced

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit – no equivalent unit.

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Links

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Assessment Requirements for UEERE5001 Design battery storage systems for grid-connected photovoltaic systems

Modification History

Not applicable.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) policy, work procedures and instructions
- ascertaining and documenting system requirements including:
  - client objectives for the proposed system
  - client budget
  - energy profile of the site where the system will be connected and producing an energy management report
  - energy management strategies
  - hazards related to the system and the site
  - relevant electricity tariffs and utility requirements
  - site inspection including existing electrical installation to meet client objectives
- designing the system including:
  - analysing, reviewing and selecting configuration to meet performance requirements
  - assessing the photovoltaic (PV) array capacity to meet performance requirements
  - determining location of equipment
  - determining sub-system efficiencies
  - determining suitable configuration/s
  - drawing the suitable configuration/s
  - selecting and sizing cables, protection and isolation devices
  - selecting type and capacity of inverter/s, including programming of parameters to meet performance requirements
  - selecting type and capacity of battery storage to meet performance requirements
  - selecting type and capacity of charge controller, including programming of parameters to meet performance requirements
- documenting the system design including:

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- compiling client documentation
- compiling installer documentation
- preparing electrical system schematic and equipment location plan
- specifying equipment including signage
- specifying system budget and performance including battery storage capacity and PV yield
- specifying maintenance requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- batteries including:
  - meaning of the terms that define aspects of batteries including:
    - amp hour capacity
    - battery
    - cell
    - charge and discharge rate
    - depth of discharge (DOD)
    - nominal voltage
    - primary and secondary cells
    - state of charge (SOC)
    - watt hour capacity
  - major features of commercially available types of batteries suitable for battery storage systems for grid-connected PV systems
  - factors affecting the life of commercially available types of batteries including the estimation of battery life
  - common processes leading to battery failure in commercially available batteries including sulphation and stratification in lead acid batteries
  - charging regimes suitable for commercially available types of batteries
  - hazards associated with handling, installing or maintaining commercially available types of batteries and risk control measures
  - procedures for safe disposal of commercially available types of batteries
- battery storage energy demand including:
  - load profiles illustrating average demand and maximum demand, based on appliances required during grid outages or during periods of high tariffs
  - total energy demand including:
    - energy required during periods of high tariffs
    - length of time of typical or expected grid outage

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- battery storage systems for grid-connected PV systems including:
  - applications for battery storage including:
    - electrical energy supply direct to loads during periods of high tariffs
    - electrical energy supply during grid outages
  - drivers of grid-connected battery storage
  - purpose of each component in a battery storage system for grid-connected PV system
  - functional block diagrams for typical configurations of battery storage systems for grid-connected PV systems including:
    - multimode inverter/s for connecting to renewable energy, grid, loads and battery storage; this inverter/s provide backup to dedicated loads on grid failure and may:
      - have a built in charge controller for direct connection of a PV array or
      - require a separate charge controller to direct current (DC) couple the PV array and battery
  - two types of inverters comprising, photovoltaic grid-connected inverters and multimode inverters where:
    - both inverter types are connected to the grid and loads via a switching device that provides backup to dedicated loads during grid failure
    - both inverter types are connected to the grid and only the multimode inverter/s provide backup to dedicated loads on grid failure
    - only the multimode inverter/s are connected to the grid; the grid-connected inverter/s are alternating current (AC) coupled to the multimode inverter/s and both types can provide backup to dedicated loads on grid failure
- charge controllers including:
  - types and applications of charge controllers within the various system configurations
  - specifications of a charge controller including:
    - DC current rating in and out
    - DC voltage operating window and/or rating
    - efficiency
    - output rating
- diagrams including:
  - electrical schematics of battery storage systems for grid-connected PV systems including modifications to switchboard to cater for specified loads
  - site diagrams to show the locations of equipment, fittings and cabling
- energy management strategies and/or energy source switching options to reduce the maximum and surge demand, based on load profile analysis
- inverters including:

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    - differences between multimode and grid-connected inverters
    - output rating of a multimode inverter in relation to:
        - capacity for battery charging
        - required maximum demand
    - program parameters for a multimode inverter, for the correct operation of the system
- maintenance and installation requirements including:
    - maintenance schedule for battery storage systems for grid-connected PV systems
    - specification of the installation and maintenance requirements for battery storage systems for grid-connected PV systems taking into consideration safety and relevant industry standards, regulations and manufacturer requirements
- system design including:
    - determining the system yield/performance, equipment costs, maintenance requirements, budget and overall life-cycle costs
    - relationship between the system components:
        - PV array, battery storage and inverters/controllers and the system design criteria
    - size and selection of the battery storage to meet the system performance requirements
    - selecting and sizing the balance of system components including:
        - earthing
        - isolation and switching devices
        - protection devices
- WHS/OHS policy, workplace procedures and instructions.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations, current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations, current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

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- relevant industry standards
- relevant industry product standards
- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- applicable documentation including:
  - energy assessment forms
  - examples of typical client requirements and site specific details
  - manufacturer technical information including:
    - data sheets, installation manuals and user guides
    - block of systems configurations and circuit diagrams
  - relevant industry standards and regulations
  - solar resource data and electricity tariffs.

Assessment must include the design of battery storage systems for grid-connected PV systems that meet the specific requirements of the client within the guidelines of relevant Australian Standards, including designs for new and retrofit installations.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to attach flexible cord and plug to electrical equipment for connection to a single phase supplies up to 230 volts (V) alternating current (a.c.) supply.

It includes planning and attaching flexible cord and plug, using test equipment for inspection and safety testing. It also includes locating, inspecting, testing and repairing faults in flexible cords and plugs.

This unit does not cover the knowledge and skills necessary for work associated with high current faults on complex electrical apparatus, circuits and electrical work; in hazardous areas or on electrical equipment that is part of an explosion-protection technique; nor, work associated with fixed wiring.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, is required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Restricted Licensing

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan electrical equipment connection	**1.1** Work is planned, sequenced and prepared in accordance with WHS/OHS requirements and workplace procedures
	1.2 Condition and ratings of cord and plugs are in accordance with workplace procedures and work instruction from appropriate person/s
	1.3 Flexible cords and plugs are selected in accordance with relevant industry standards and workplace procedures for condition and rating
	1.4 Materials necessary to complete work are obtained and checked in accordance with workplace procedures and work instructions
	1.5 Tools, equipment and testing devices needed to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.6 Flexible cord and plugs are prepared without damage to insulation and conductors and in accordance with relevant industry standards
2 Attach flexible cord and plugs	**2.1** WHS/OHS workplace policies and procedures are followed
	2.2 Single insulated metal framed equipment is earthed in accordance with relevant industry standards and workplace procedures
	2.3 Double insulated equipment is inspected and maintained in accordance with relevant industry standards and workplace procedures
	2.4 Conductors are connected to terminals ensuring required polarity is in accordance with relevant industry standards

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3	**Inspect and test equipment for operation and safety**	**3.1** Electrical installation and operation of cord and plug/s connected to electrical equipment are inspected and tested in accordance with relevant industry standards, work instructions and workplace procedures
		3.2 Quality checks of work are undertaken in accordance with workplace procedures
4	**Locate and repair fault in flexible cord and plug/s**	**4.1** Electrical equipment and attached flexible cord and plug/s are isolated in accordance with WHS/OHS requirements and workplace procedures
		4.2 WHS/OHS workplace policies and procedures are followed
		4.3 Quality checks of the attached flexible cord and plug/s are undertaken in accordance with workplace procedures to detect any abnormal, damage or fault
		4.4 Faults in attached flexible cord and plug/s are determined and details of components to be replaced are recorded in accordance with workplace procedures
		4.5 Faults in attached flexible cord and plug/s are repaired, as required, in accordance with workplace procedures
		4.6 Repairs are inspected and tested for compliance with industry standards
		4.7 Unplanned events are referred to supervisor for direction in accordance with workplace procedures
		4.8 Status report/s is completed and supervisor notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Attaching cords and plugs to electrical equipment must include:	• any cord, cable and plug connected to equipment and cord extension leads intended for single phase supplies up to 230 V
Safe working procedures within in the scope of this unit must:	• be in accordance with AS/NZS 4836 Safe working on low-voltage electrical installations

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP024A Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying quality to workplace procedures and instructions
- attaching flexible cord/s and plug/s and without damage
- inspecting flexible cords and plugs for damage, faults or abnormalities
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- determining the current rating of a range of commonly used flexible cords
- drawing of a basic electrical circuit using correct symbols
- testing flexible cords, plugs and connected equipment for operation and safety up to 230 volts (V) alternating current (a.c.), including polarity and continuity testing
- finding and repairing faults in attached flexible cords and plugs in accordance with established procedures
- preparing to attach flexible cord and plug supplies up to 230 V a.c. supply
- providing status report/s
- using testing equipment
- selecting appropriate flexible cords for a range of single phase appliances relating to application, load and service duty
- identifying correct plug and socket polarities for the range of commonly used 230 V plug socket combinations
- selecting the correct plug and socket combinations for a range of applications, including use in damp areas
- fitting a range of various plugs and sockets with attention to requirements, colour code, polarity and correct termination of conductors with the sheath well into the body, and the cord grip anchored
- terminating cords to several appliances utilising the appropriate cord type and rating.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- electrical safety requirements, including the requirements of AS/NZS 4836 Safe working on low-voltage electrical installations
- basic electrical circuits, including:
  - simple electric circuit (supply, control device and load)
  - industry standard symbols, units of measurement and the abbreviation for electromotive force, potential difference, current and resistance
  - using multiples and sub-multiples for voltage, current and resistance values
  - a.c and direct current (d.c.) supplies
  - single phase electrical loads
  - electrical circuit protection devices
- relationships in an electrical circuit, including:
  - relationship between voltage, current and resistance (Ohm's Law)
  - changes in circuit parameters for altered values of voltage, current and resistance
  - electrical power in relationship to d.c. or resistive a.c. circuits
- test equipment - resistance measurement, including:
  - types of electrical test equipment used for resistance measurement (analogue and digital multimeters, insulation resistance testers and continuity testers)
  - selection of appropriate electrical test instrument for continuity and insulation resistance measurement
  - using analogue and digital multimeters for resistance measurement (ensuring zero setting, correct scale selection, avoidance of parallax error and estimation of between division readings for analogue multimeters)
  - continuity tests and using a continuity tester to check the polarity of a three-core extension cord
  - insulation resistance tests and minimum values for insulation resistance for low voltage (LV) equipment
  - reasons for insulation resistance testing is conducted at higher than supply voltage to relevant industry standards
  - using insulation resistance handheld tester
  - care and storage of electrical instruments
  - regulatory requirements relating to the maintenance and testing of test instrumentation for resistance measurement
- selection of flexible cords and plugs to suit given applications, including:
  - types, structures and applications of common cores, including:
    - parallel two core unsheathed ('figure 8')
    - cords, light duty sheathed
    - ordinary duty sheathed

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    - heavy duty sheathed
    - textile braided
  - service duty
  - purpose of colour coding and the recommended single phase colour code
  - conventional code used in the most common alternative colours
  - factors affecting the choice of plugs and sockets, including ingress protection (IP) rating
- connecting flexible cords and plugs to appliances, including:
  - design features of plugs and sockets which protect the conductor terminations from undue force when disconnecting a cord - tortuous path
  - cord preparation - not to mark/damage the inner core when stripping the sheath for termination, double the end of the conductor to be terminated
  - purpose of earthing
  - structure of double insulated appliances, symbol, reasons they should not be earthed, and maintenance of the integrity of the double insulation
  - preparation of the surfaces at an earthing connection before and after completion of the termination, including terminations exposed to corrosion, and those for which no specific earthing terminal is provided
  - techniques for fitting plugs and sockets
  - techniques for terminating cords and conductors including consequences of poor electrical terminations
- testing, including:
  - importance of conducting both visual and electrical tests to ensure leads are safe and appropriate for connection to supply in regard to physical condition
  - checking the polarity of plug, and for any abnormal or obvious damage or fault
  - minimum acceptable value of insulation resistance between active neutral and earth
  - conducting insulation resistance and continuity tests prior to, and after, connecting cords and plugs to appliances
  - visually checking that the cord/plug assembly has a suitable IP rating for the operating environment
  - visual checks to ensure that arrangements for protection against dangers of mechanical movement as relevant are undamaged and in place
  - techniques for fault finding attached cords and plugs, and cord extension leads
- producing documentation and reports, including:
  - nature and content of, and the need to produce, status reports and documents
- relevant WHS/OHS legislated requirements including inspection and testing of electrical equipment
- relevant industry standards
- relevant manufacturer specifications and operating instruction for tools, equipment and testing devices
- relevant safe job safety assessments or risk mitigation processes
- relevant workplace policies, procedures and instructions, including relevant workplace quality procedures.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to attach flexible cords, cables and plugs to electrical equipment connected to a supply up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.).

It includes planning and attaching flexible cords, cables and plugs; and using test equipment for inspection and safety testing. It also includes locating, inspecting, testing and repairing faults in flexible cords and plugs.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

Competency Field

Restricted Licensing

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan electrical equipment connection	**1.1** Work is planned, sequenced and prepared in accordance with WHS/OHS requirements and workplace procedures
	1.2 Condition and ratings of cords, cables and plugs is in accordance with workplace procedures and work instruction from relevant person/s
	1.3 Flexible cords, cables and plugs are selected in accordance with relevant industry standards and workplace procedures for condition and rating
	1.4 Materials necessary to complete work are obtained in accordance with workplace procedures and checked against work instructions
	1.5 Tools, equipment and testing devices needed to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.6 Flexible cords, cables and plugs are prepared without damage to insulation and conductors and in accordance with relevant industry standards
2 Attach flexible cords, cables and plugs	**2.1** WHS/OHS policies and workplace procedures are followed
	2.2 Single insulated metal framed equipment is earthed in accordance with relevant industry standards and workplace procedures
	2.3 Double insulated equipment is inspected and maintained in accordance with relevant industry standards and workplace procedures
	2.4 Conductors are connected to terminals ensuring required polarity is in accordance with relevant industry standards
3 Inspect and test equipment for operation and safety	**3.1** Electrical installation and operation of the cord/cable/s and plug/s connected to equipment are inspected and tested in accordance with relevant industry standards, work instructions and workplace procedures

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	3.2	Quality checks of work are undertaken in accordance with workplace procedures
4 Locate and repair faults in attached flexible cords, cables and plugs	**4.1**	Electrical equipment and attached flexible cords, cables and plugs are checked and isolated in accordance with workplace procedures
	4.2	WHS/OHS policies and workplace procedures are followed
	4.3	Visual inspection and checks of the attached flexible cords, cables and plugs are conducted in accordance with workplace procedures to detect any abnormal, damage or fault
	4.4	Faults in attached flexible cords, cables and plugs are confirmed and determined, components to be replaced are identified and details recorded in accordance with workplace procedures
	4.5	Faults in attached flexible cords, cables and plugs are repaired in accordance with workplace procedures
	4.6	Unplanned events are referred to relevant person/s for direction in accordance with workplace procedures
	4.7	Status report/s is completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Attaching cords, cables and plugs to electrical equipment must include the following:	• cords, cables and plugs connected to equipment or cords, cables extension leads intended for multi-phase supplies up to 1,000 V a.c. to 1,500 V d.c. This unit does not cover the knowledge and

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skills necessary for the following work:

- competencies associated with fixed wiring
- in hazardous areas or on electrical equipment that is part of an explosion-protection technique
- on complex electrical apparatus, circuits and electrical work.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP025A Attach cords, cables and plugs to electrical equipment for connection to 1000 Va.c. or 1500 Vd.c. supply.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying to quality, workplace procedures and instructions
- attaching cords, cables and plugs to electrical equipment for connection to 1,000 volts (V) alternating current (a.c.) or 1,500 volts (V) direct current (d.c.) supply
- attaching, replacing and repairing flexible cords, cables and plugs to equipment for operation, safely up to 1,000 V a.c. to 1,500 V d.c.
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- finding and repairing fault/s in attached flexible cords, cables and plugs
- inspecting and testing flexible cords, cables, plugs and equipment for operation and safety up to 1,000 V a.c. to 1,500 V d.c.
- planning and preparing to attach flexible cords, cables and plugs up to 1,000 V a.c. to 1,500 V d.c.
- providing status reports
- replacing and repairing flexible cords, cables and plugs up to 1,000 V a.c. to 1,500 V d.c.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safety, including:
  - WHS/OHS and electrical safety requirements
  - requirements of AS/NZS 4836 Safe working practices on low voltage installations
- selection of flexible cords, cables and plugs to suit given applications, including:

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  - multi-phase systems
  - structure of plug pin configuration
  - applications of commonly used flexible cords, cables and plugs for connection to 1,000 V a.c. or 1,500 V d.c. supply
  - determining the current rating of a range of commonly used flexible cords, cables and plugs for connection to 1,000 V a.c. or 1,500 V d.c. supply
  - determining the number of cores/pins required for given situations
  - multi-phase colour code and the conventional code used in the most common cords and cables
  - selecting flexible cords and cables for given multi-phase loads to 1,000 V and service duty
  - selecting multi-phase plugs to 1,000 V for a given load and ingress protection (IP) rating
  - selecting the correct plug and socket combinations for a range of applications, including use in damp areas
- flexible cords, cables and plugs connected to multi-phase equipment, including:
  - design features of plugs and sockets which protect the conductor terminations from undue force when disconnecting a cord - tortuous path
  - cord preparation - not to mark/damage the inner core when stripping the sheath for termination, double the end of the conductor to be terminated
  - preparation of the surfaces at an earthing connection before and after completion of the termination, including terminations exposed to corrosion, and those for which no specific earthing terminal is provided
  - prepare flexible cords, cables for connection
  - single insulated metal framed equipment is earthed in accordance with requirements or the integrity of double insulated equipment is maintained
  - fitting a range of various multiphase flexible cords, cables, plugs, and sockets with attention to tortuous path requirements, colour code, polarity and correct termination of conductors with the sheath well into the body, and the cord grip anchored
- determine that a flexible cord, cable and plug is safe and is connected correctly, including:
  - importance of conducting both visual and electrical tests to ensure leads are safe and appropriate for connection to supply in regard to physical condition, sufficiently high insulation resistance, continuity, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating, and arrangements for protection against dangers of mechanical movement as relevant are undamaged and in place
  - check polarity of plug, and for any abnormal or obvious damage or fault
  - minimum acceptable value of insulation resistance between actives, neutral and earth
  - insulation resistance and continuity tests prior to, and after, connecting cords, cables and plugs to appliances
  - fault finding attached multi-phase flexible cords, cables and plugs, and multi-phase cord extension leads
- producing documentation and reports, including:
  - nature and content of, and the need to produce, status reports and documents
  - producing status reports and documents

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- problem-solving techniques
- producing documentation and reports
- relevant industry standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications and operating instruction for tools, equipment and testing devices
- relevant WHS/OHS legislated requirements, including relevant inspections and tests
- relevant workplace policies, procedures and instructions
- relevant workplace quality procedures
- selection of flexible cords, cables and plugs to suit given applications.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to attaching cords, cables and plugs to electrical equipment for connection to 1,000 V a.c. or 1,500 V d.c. supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0003 Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to conduct in-service safety testing of electrical cord connected equipment and cord assemblies.

It includes working safely, using portable appliance tester (PAT), identifying faults, applying tagging, arranging for repair of faulty equipment and complete testing documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Restricted Licensing

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to test cord connected apparatus and cord assemblies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control work preparation measures and procedures are followed

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	1.3	Advice is sought from relevant person/s to ensure work is effectively coordinated with others
	1.4	Cord connected apparatus and cord assemblies to be tested are obtained in accordance with workplace procedures
	1.5	PAT device is checked for correct operation and safety in accordance with relevant industry standards and workplace procedures
2 Test cord connected apparatus and cord assemblies	**2.1**	WHS/OHS risk control work measures and procedures are followed
	2.2	Measures are followed to ensure that cord connected apparatus and cord assemblies to be tested are not connected to the electrical supply in accordance with relevant industry standards
	2.3	Electrical safety requirements and parameters are applied to ensure correct test results are in accordance with relevant industry standards
	2.4	Visual inspection and checks of the cord connected apparatus and cord assemblies are carried out in accordance with workplace procedures to detect any abnormal damage or fault
	2.5	Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
	2.6	PAT routines are followed to test cord connected apparatus and cord assemblies in accordance with workplace procedures
	2.7	Unsafe cord connected apparatus and cord assemblies are identified from test results in accordance with workplace procedures
	2.8	Testing is undertaken effectively to minimise waste of energy and damage to apparatus
3 Tag cord connected apparatus and cord assemblies and document testing activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed

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3.2 Worksite is cleaned and made safe in accordance with workplace procedures

3.3 Cord connected apparatus and cord assemblies are tagged in accordance with workplace procedures for their safety status

3.4 Arrangements are made for unsafe cord connected apparatus and cord assemblies to be repaired by relevant person/s

3.5 Safety testing activities are documented in accordance with relevant industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

In-service safety testing must include the following:	• at least two different electrical cords and three different items of cord connected equipment with safety faults, including:
	  • a device containing an element
	  • a device containing a motor
	  • a device containing metal oxide varistors (MOV)

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP026A Conduct in-service safety testing of electrical cord connected equipment and cord assemblies.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0003 Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying appropriate tagging
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- connecting cords and apparatus to the testing device
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- documenting testing activities, including workplace register
- identifying safe and unsafe cords and apparatus
- preparing to test cord connected apparatus and cord assemblies
- preparing and using the portable appliance tester (PAT)
- safety testing of electrical cord connected equipment and cord assemblies
- tagging tested cord connected apparatus and cord assemblies and document testing activities
- using test results to determine the safety status.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- Australian Standards and Commonwealth/state/territory legislation and regulations including:
  - Australian Standard AS/NZS 3760 In-service safety inspection and testing of electrical equipment
  - Commonwealth/state/territory WHS/OHS Acts and regulations
  - limitations of work that can be undertaken
  - codes of practice and associated guidance material
  - risk management principles

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- basic electrical testing concepts, including:
  - basic electrical circuits
  - functions of electrical circuit
  - conductors and insulators
  - basic electrical supply system
  - relationship of electrical quantities
  - effects of electrical currents
  - methods/devices used to negate or minimise electrical shock
  - PAT
  - PAT maintenance and calibration
- electrical equipment and cord assemblies testing, including:
  - classification of electrical equipment
  - inspection of electrical equipment (visual inspections)
  - using PAT:
    - earth continuity testing
    - insulation resistance testing
    - polarity testing (extension cords and IEC cords)
- testing and tagging documentation requirements, including:
  - risk assessment documentation
  - frequency of inspection and testing
  - tagging of equipment
  - records maintenance
- electrical cord testing and tagging documentation requirements
- electrical equipment and cord assemblies testing
- electrical testing concepts
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant legislation and regulations
- relevant manufacturer specifications
- relevant testing and tagging of portable and cord connected electrical apparatus
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities. equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to conducting in-service safety testing of electrical cord connected equipment and cord assemblies
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to disconnect and reconnect electrical equipment connected to low voltage (LV) installation wiring.

It includes preparing electrical equipment for disconnecting and then reconnecting equipment connected to LV installation wiring. It also includes inspecting and testing the reconnected electrical equipment for safe operation, identifying and reporting electrical faults and providing status reports. This must be incidental to a primary or regular function of the workplace.

The unit excludes disconnecting or reconnecting circuits at a switchboard or to general electrical accessories (including switches, socket outlets and circuit protective devices), or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installation work).

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

The skills and knowledge described in this unit may require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Additional and/or other conditions may also apply under State and Territory legislation and regulations related to licencing, electrical work and work health and safety (WHS)/occupational health and safety (OHS) regulations, which must be confirmed prior to commencing this unit.

In some jurisdictions additional information related to licencing may be required on certification documentation. Further guidance can be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

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Competency Field

Restricted Licensing

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to disconnect electrical equipment	**1.1** Electrical equipment disconnection is planned to ensure WHS/OHS policies and procedures are followed
	1.2 Relevant person/s is consulted to ensure work is coordinated effectively with others involved at the worksite
	1.3 Safety hazards which have not previously been identified are documented, risks assessed, and control measures determined and implemented in consultation with relevant person/s and in accordance with workplace procedures
	1.4 Point of isolation of electrical equipment to be disconnected is determined
	1.5 Tools, equipment and testing devices needed to carry out electrical work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Disconnect electrical equipment	**2.1** WHS/OHS policies and workplace procedures are followed
	2.2 Electrical equipment is isolated in accordance with relevant electrical installation industry standards and workplace procedures
	2.3 Isolated equipment is confirmed as de-energised
	2.4 Conductor connection sequence is recorded and labelled in accordance with workplace procedures

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	2.5	Visual inspection and checks of the electrical equipment and associated wiring are carried out in accordance with workplace procedures to detect any abnormal or obvious damage or fault
	2.6	Electrical equipment is disconnected from fixed wiring without damage to other components
	2.7	Disconnected conductors/cables are terminated in accordance with relevant industry standards to ensure they are safe and present no potential hazard
	2.8	Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
3 Prepare to reconnect electrical equipment	**3.1**	Reconnection is planned to ensure WHS/OHS policies and workplace procedures are followed
	3.2	Relevant person/s is consulted to ensure work is coordinated effectively with others involved in the work site
	3.3	Point of isolation of the circuit to which the electrical equipment to be connected is determined
	3.4	Replacement electrical equipment is selected on the basis of rating and specifications being the same as that of the original electrical equipment
	3.5	Appropriate person/s is consulted in the event that replacement electrical equipment is not available
	3.6	Original and/or replacement electrical equipment is inspected and tested to ensure it is safe to connect to the electrical supply and use
	3.7	Tools, equipment and testing devices needed to carry out electrical work, are obtained in accordance with workplace procedures and checked for correct operation and safety
4 Reconnect electrical equipment	**4.1**	WHS/OHS policies and procedures are followed
	4.2	Measures are taken to ensure circuit to which electrical equipment is to be connected remains isolated and de-energised in accordance with relevant electrical installation industry standards and workplace procedures

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	4.3	Earth continuity of the equipment is tested to determine whether it is in accordance with relevant industry standards
	4.4	Insulation resistance of the equipment is tested to confirm that it is in accordance with relevant industry standards
	4.5	Appropriate person/s is consulted regarding any non-compliant conditions identified during testing
	4.6	Electrical equipment is connected in accordance with previously recorded conductor connection sequence and relevant industry standards
	4.7	Connections to the equipment are checked to confirm they are correct
	4.8	Continuity between exposed conductive parts of the equipment and the main earth or metal switchboard enclosure is confirmed
5 Test the reconnected electrical equipment for safe operation	**5.1**	WHS/OHS policies and workplace procedures for the reinstatement of isolated circuits and electrical equipment is followed
	5.2	Supply is reinstated to equipment and checked in accordance with established procedures and industry requirements
	5.3	Arrangements are made with relevant person/s to test the operation of the electrical equipment in accordance with workplace procedures
	5.4	Operational non-conformances are identified and reported in accordance with workplace procedures
6 Complete compliance documentation	**6.1**	Equipment status report/s are completed and relevant person/s notified in accordance with task requirements and workplace procedures
	6.2	Complete compliance documentation in accordance with industry standards and regulatory requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Disconnection and reconnection of electrical equipment must include at least one of the following, and must be selected to align with the candidates' primary trade or work function:	• air conditioning/refrigeration equipment • instrumentation equipment • electronic equipment • electrical equipment • neon signs • composite equipment • control devices • water heaters • motors • gas appliances
MUST NOT INCLUDE: disconnect/reconnect electrical equipment connected to supplies up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.) must not include the following:	• electrical work associated with fixed wiring, circuits at a switchboard or to general electrical equipment, including switches, socket outlets, circuit protective devices etc • in hazardous areas or on electrical equipment that is part of an explosion-protection technique • where high fault currents are possible • which are luminaires

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - selecting and using and appropriate range of personal protective equipment (PPE)
  - hazard identification
  - using risk control measures
  - using safe working practices when carrying out electrical disconnect/reconnect work
  - working safely with low voltage (LV) electrical installations
- determining electrical characteristics of electrical equipment
- selecting tools, equipment and testing devices
- identifying the point of isolation
- preparing to disconnect and reconnect electrical equipment
- disconnecting and reconnecting electrical equipment
- connecting circuits from the schematic diagrams
- connecting and using voltmeters and ammeters, including selecting the correct range in terms of magnitude and whether the supply is alternating current (a.c.) or direct current (d.c.)
- isolating, testing and tagging accessories
- connecting a simple electrical circuit, including supply, control switch and load
- measuring voltage and current within a simple circuit
- producing a wiring diagram of the connections used in following the schematic diagram
- connecting a simple circuit following a wiring diagram
- producing a schematic diagram from the wiring diagram
- using an analogue multimeter for voltage measurement ensuring the following: setting zero, correct scale, a.c. or d.c., polarity and magnitude, avoiding parallax error and estimating between division readings
- using a digital multimeter for voltage measurement ensuring the following: correct range and no active conductors are connected to any meter earth
- measuring resistance using a digital multimeter

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- conducting insulation resistance tests using a handheld insulation tester after checking for zero and meter calibration
- checking the polarity of a three-core extension cord using a continuity tester
- measuring current using a clip-on (tong tester) taking each circuit conductor in turn
- terminating cables using stud, screw, tunnel and lug terminal types employing the correct preparation and the relevant terminating tools
- identifying the type and arrangement of circuits supplying equipment that is to be disconnected
- testing the availability of supply for electrical equipment about to be disconnected
- locating isolation device/s, including lockable adjacent switching device, and/or identification of fuse/circuit breaker at switchboard, and use of equipment schedules where provided
- determining the method of isolation to be used; which available device
- isolating a supply at a fuse, ensuring the fuse wedge is removed only after the electrical equipment is turned off and demonstrating why the empty wedge is replaced once the fusible link has been removed
- isolating a supply at a circuit breaker, ensuring the circuit breaker is locked and secured in the open position
- undertaking tests to determine if the electrical equipment is turned off when isolating at a fuse/circuit breaker
- using danger tags at the point of isolation
- identifying the type and arrangement of circuits supplying equipment that is to be disconnected from a single phase and/or multiphase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
- applying procedures that ensure the safe isolation of the supply to equipment which is to be disconnected
- disconnecting isolated equipment from fixed wiring with minimal damage to wiring system after ensuring no visible faults or damage, and the recording of conductor connection sequence
- applying termination practices in regard to disconnected wiring
- checking the new electrical equipment nameplate details against those of the electrical equipment being replaced
- visually inspecting and testing equipment's electrical characteristics using suitable test equipment to ensure equipment is safe to connect in regard to sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate ingress protection (IP) rating, and arrangements for protection against dangers of mechanical movement are undamaged and in place
- testing compliance of the electrical equipment, i.e. insulation resistance and continuity
- testing the disconnected electrical equipment for faults (open circuits, partial open circuits, short circuits, partial short circuits and earth faults), and recognise any unsatisfactory test results obtainedidentifying the type and arrangement of circuits supplying equipment that is to be reconnected to a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
- reconnecting electrical equipment to fixed wiring with minimal damage to wiring system
- ensuring continuity between exposed conductive parts of the equipment and the main earth or

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metal switchboard enclosure
- restoring supply after ensuring correct connections, and all safety requirements have been met
- testing the supply at the electrical equipment
- restoring all mechanical protection, e.g. terminal covers
- checking operation of reconnected equipment
- dealing with unplanned events/situations in accordance with workplace procedures and in a manner that minimises risk to personnel and equipment
- producing reports and documents to describe a suitable procedure to safely disconnect a component from a single-phase supply and/or multi-phase supply in accordance with workplace, industry and regulatory requirements
- producing reports and compliance documentation for the safe reconnection/commissioning of a component to the supply in accordance with workplace, industry and regulatory requirements
- completing required regulatory compliance documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- the basic electrical circuit, including:
  - elements of a simple electric circuit (supply, control switch, protection device and load)
  - definition, the symbol and the abbreviation of the unit for electromotive force, potential difference, current and resistance
  - types of electrical load
  - need for devices to afford electrical protection and the mechanisms used in protection devices, including resetting
  - a.c supply (both single and multi-phase) and d.c. supply
  - need for isolating, testing and tagging electrical circuits
- relationships in an electrical circuit, including:
  - relationship between voltage, current and resistance
  - definition of power in electrical terms (for d.c. or resistive a.c. circuits)
  - electrical diagrams, including:
    - symbols used for fuse, circuit breaker, isolator, normally open contacts, normally closed contacts, coil, energy meter, a.c. motor and transformer
    - using a block diagram as means of developing concepts and understanding
    - function of single line diagrams, including their application in three phase systems
    - definition of a circuit or schematic diagrams
    - wiring diagrams
- test equipment selection and care, including:
  - fault currents and the implications of incorrectly connecting a meter to a high fault current

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source
    - category ratings of multimeters in terms of their breaking capacity (fault current interruption) and identification of the appropriate category of instrument for typical domestic work and for typical commercial work
    - regulatory requirements in regard to the maintenance and testing of test instrumentation
    - steps and procedures for the safe use, care and storage of electrical instruments
    - selecting test equipment for given situations
- test equipment - voltage measurement, including:
    - voltage measurement - meters connected in parallel
- test equipment - resistance measurement, including:
    - insulation resistance, and the required minimum values for insulation resistance LV equipment (including the insulation resistance values for electrical equipment incorporating heating elements)
    - insulation resistance needs to be measured at higher than supply voltage and the voltages to be used
    - continuity and what a continuity tester does
- test equipment - current measurement, including advantage/s of the clip-on method of current measurement
- cable connections, including:
    - construction of typical power cables
    - principle of operation of the following types of terminals stud, screw, tunnel and lugs
    - cable preparation and terminating methods appropriate to each type of terminal, including any special requirements which apply
- protection for safety, including:
    - dangers associated with earth-faults
    - protection of persons against electric shock from earth-faults
    - maintaining a low earth-fault current path resistance
    - components in an earth-fault current path
    - regulatory issues/requirements/limitations in regard to working live
- safety testing preparation and procedures, including:
    - faulty earth-fault current paths
    - using safe working practices when carrying out fault-finding work
    - identification of earthing system components
    - unsatisfactory resistance of a fault current path
    - actions to rectify unsatisfactory resistance of an earth-fault current path or insulation
- isolating supplies, including:
    - regulatory requirements in regard to working de-energised, and ensuring and maintaining isolation
    - reasons for advising all personnel likely to be affected
    - preventing others wanting to remake supply
    - reason for isolation and approximate time of outage to allow planning of alternate

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activities
  - identification of the type and arrangement of circuits supplying equipment that is to be disconnected
  - use of and reason for danger tags at the point of isolation
  - reason for the following steps: testing on a known live supply, testing for isolation, retesting on a known live supply after confirming isolation
- disconnecting electrical equipment - LV, including:
  - identification of the type and arrangement of circuits supplying equipment that is to be disconnected from a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
  - procedures that ensure the safe isolation of the supply to equipment which is to be disconnected
  - disconnection of isolated equipment from fixed wiring with minimal damage to wiring system after ensuring no visible faults or damage, and the recording of conductor connection sequence
- reconnecting electrical equipment - LV, including:
  - importance of checking the new electrical equipment nameplate details against those of the electrical equipment being replaced
  - need to visually inspect and test the equipment's electrical characteristics using suitable test equipment to ensure equipment is safe to connect in regard to sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating, and arrangements for protection against dangers of mechanical movement are undamaged and in place
  - procedures for equipment with unsatisfactory results - unsuitability for reconnection
  - identification of the type and arrangement of circuits supplying equipment that is to be reconnected to a single phase and/or multi-phase supply of voltages up to 1,000 V a.c. or 1,500 V d.c.
  - procedures ensuring isolation of supply
  - engaging appropriately qualified person to rectify any non-compliance
- produce documentation and reports in accordance with workplace, industry and regulatory requirements, including:
  - need to produce status reports and documents to locate and identify isolation mechanisms for a wide range of circuits and associated loads
  - production of reports and documents to use a suitable procedure to safely disconnect a component from a single-phase supply and/or multi-phase supply
  - content required in reports and documents used to safely determine the suitability of a component for reconnection to supply
  - production of reports and documents for the safe reconnection/commissioning of a component to the supply.
  - need to comply with regulatory compliance documentation requirements.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, including where not permissible under regulatory and licencing requirements, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources used should reflect current industry practices in relation to disconnecting and reconnecting electrical equipment connected to a LV supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to locate and rectify faults in low voltage (LV) electrical equipment.

It includes following workplace procedures to inspect and test electrical equipment, identify and rectify faults and complete reporting. This must be incidental to a primary or regular function of the workplace. The Range of Conditions describes exclusions for this unit of competency.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

The skills and knowledge described in this unit may require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Additional and/or other conditions may also apply under State and Territory legislation and regulations related to licencing, electrical work and work health and safety (WHS)/occupational health and safety (OHS) regulations, which must be confirmed prior to commencing this unit.

In some jurisdictions additional information related to licencing may be required on certification documentation. Further guidance can be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERL0004 Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

Competency Field

Restricted Licensing

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to identify faults	**1.1** Work is planned to ensure WHS/OHS policies and workplace procedures are applied
	1.2 Tools, electrical equipment and testing devices required for work are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.3 Relevant person/s is consulted to ensure the work is coordinated with others
	1.4 Electrical characteristics of electrical equipment and electrical supply are determined and recorded in accordance with workplace procedures
	1.5 Electrical equipment and associated circuits are identified for isolation purposes in accordance with workplace procedures
2 Locate faults in the electrical equipment	**2.1** Electrical equipment and associated circuits are isolated in accordance with workplace procedures
	2.2 WHS/OHS workplace policies and procedures are followed
	2.3 Visual inspection and checks of the electrical equipment and components are carried out to detect any abnormality, damage or fault in accordance with workplace procedures
	2.4 Wiring diagrams are checked and possible fault causes identified based on the wiring diagrams
	2.5 Faults are confirmed and components to be replaced or adjusted are determined and details recorded in accordance with workplace procedures
	2.6 Electrical equipment is dismantled and/or removed, as required, and components stored to protect them against

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		loss or damage in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Rectify faults	**3.1**	Materials and resources required to complete work are obtained in accordance with workplace procedures and job requirements
	3.2	Adjustments are made to electrical equipment for operation and parameters in accordance with manufacturers requirements, workplace procedures and relevant industry standards
	3.3	Faults are rectified in accordance with workplace procedures
	3.4	Approval for contingencies is obtained from appropriate person/s before implementation in accordance with workplace procedures
	3.5	Tests on the electrical equipment are performed in accordance with industry procedures to ensure safe return to service and operation of equipment
	3.6	Report/s, documentation and compliance certifications are completed in accordance with workplace, industry and regulatory requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Locating and rectifying faults in LV electrical equipment must include at least one single phase and one multi-phase item of equipment of any of the following, and must be selected to align with the candidates' primary trade or

- air conditioning/refrigeration equipment
- instrumentation equipment
- electronic equipment
- electrical equipment
- neon signs

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work function:	• composite equipment • control devices • water heaters • motors • gas appliances

MUST NOT INCLUDE locating and rectifying faults in electrical equipment intended to operate from fixed wired supply up to 1,000 V a.c. or 1,500 V d.c. and not listed above. This includes:	• electrical work associated with fixed wiring, circuits at a switchboard or to general electrical equipment, including:
	  • switches, socket outlets, circuit protective devices etc); or
	  • installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installation work)
	• in hazardous areas or on electrical equipment that is part of an explosion-protection technique
	• where high fault currents are possible
	• which are luminaries

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0005 Locate and rectify faults in low voltage (LV) electrical equipment using set procedures

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - selecting and using and appropriate range of personal protective equipment (PPE)
  - hazard identification
  - using risk control measures
  - using safe working practices when carrying out electrical disconnect/reconnect work
  - working safely with low voltage (LV) electrical installations
- dealing with unplanned events
- using routine fault-finding techniques, workplace procedures and problem-solving techniques to locate and rectify faults in LV electrical equipment
- following safe work method statements (SWMS) and procedures
- using wiring diagrams to assist in identifying fault locations
- identifying, inspecting, testing and isolation of electrical equipment
- preparing to replace, implementing repairs and reconnecting electrical equipment
- applying safe procedures to discharge a capacitor
- returning to service and testing for polarity, continuity and insulation resistance
- using safe working practices when carrying out fault finding
- identifying common types of electrical faults (open circuit, short circuit, partial open circuit and partial short circuit)
- interpreting ratings from nameplates for comparison with any replacement
- visual checking techniques on a range of single and multi-phase equipment
- using test instrumentation, safely conduct procedures to identify faults in a range of single and multi-phase equipment
- rectifying all identified faults and ensuring appropriate consultation/approval before implementing contingencies
- checking repaired equipment for safe and correct operation
- producing reports and documents for the identification and rectification of faults in electrical

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LV equipment in accordance with workplace procedures and regulatory and compliance documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- safe fault finding, including:
  - identification of common types of electrical faults (open circuit, short circuit, partial open circuit and partial short circuit) in single and multi-phase equipment
  - test equipment to locate common faults
  - techniques for using wiring diagrams to identify possible fault locations
- types of single and multi-phase equipment, including:
  - identifying basic principles of operation of typical equipment
  - visual inspection and checking techniques on a range of single/multi-phase equipment
  - interpretation of ratings from nameplates for comparison with any replacement
  - principles of operation of control equipment and protection devices associated with a range of single/multi-phase equipment
- problem-solving techniques, including:
  - symptoms of common faults
  - common faults that occur in single and multi-phase equipment and the indicators of such faults
  - techniques to ensure the electrical isolation and the maintenance of electrical isolation of single/multi-phase equipment when conducting fault finding
  - regulatory requirements/obligations regarding any live testing that may be unavoidable
  - fault-finding procedures
  - rectification of identified faults ensuring appropriate consultation/approval before implementing contingencies
- documentation and reporting- including:
  - reporting and recording systems
  - relevant workplace documentation, including quality, policies and procedures
  - status reports and documents related to locating and identifying isolation mechanisms for a wide range of circuits and associated loads
  - reports, documents and procedures related to safely locating and rectifying faults in electrical LV equipment
- relevant job safety assessments or risk mitigation processes include safe working methods statements
- relevant industry standards, including AS/NZS 4836 Safe working on or near low-voltage electrical installations and equipment
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, including where not permissible under regulatory and licencing requirements, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry
- resources used should reflect current industry practices in relation to disconnecting and reconnecting electrical equipment connected to a LV supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, Standards, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0006 Attach HV flexible cables and plugs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to attach flexible cords, cables and plugs, including trailing and feeder cables, to high voltage (HV) electrical equipment connected to a supply exceeding 1,000 volts (V) alternating current (a.c). or 1,500 volts (V) direct current (d.c.).

It includes working safely; identifying plug configurations; selecting and using inspecting, testing and measuring devices; terminating and connecting HV flexible cables, plugs and conductors; safety testing and reporting.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERL0001 Attach cords and plugs to electrical equipment for connection to a single phase 230 volt supply

UEERL0002 Attach cords, cables and plugs to electrical equipment for connection to 1,000 V a.c. or 1500 V d.c. supply

Competency Field

Restricted Licensing

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to attach flexible cables and plugs	**1.1** Work is planned, sequenced and prepared in accordance with WHS/OHS requirements and workplace procedures
	1.2 Condition and ratings of cables and plugs are determined from relevant industry standards and work instructions from relevant person/s
	1.3 Flexible cables and plugs are selected in accordance with relevant industry standards and workplace procedure for condition and rating
	1.4 Materials necessary to complete work are obtained in accordance with workplace procedures and checked against work instruction
	1.5 Tools, equipment and testing devices needed to carry out work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Attach flexible cables and plugs	**2.1** WHS/OHS policies and procedures are followed
	2.2 Flexible cables and plugs are prepared without damage to insulation and conductors and in accordance with relevant industry standards
	2.3 Equipment is earthed in accordance with relevant industry standards and confirmed de-energised
	2.4 Visual inspection and checks of the electrical equipment and associated wiring are conducted in accordance with workplace procedures to detect any abnormal damage or fault
	2.5 Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
	2.6 Insulated equipment is inspected and maintained in accordance with relevant industry standards and workplace procedures

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	2.7	Conductors are connected to terminals ensuring the required polarity is in accordance with relevant industry standards
3 Inspect and test equipment for operation and safety	**3.1**	HV electrical installation and operation of cables and plugs connected to equipment are inspected and tested in accordance with relevant industry standards, work instructions and workplace procedures
	3.2	Approval is obtained from relevant person/s to confirm completion of work is in accordance with workplace procedures before supply is connected
	3.3	Status reports are completed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Flexible cables and plugs for connecting equipment intended to operate at HV must not include:	• where high fault currents are possible • on complex electrical work • competencies associated with fixed wiring

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP023A HV Flexible Cables and Plugs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0006 Attach HV flexible cables and plugs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying quality, workplace procedures and instructions
- attaching flexible cables and plugs to electrical equipment connected to high voltage (HV) electrical equipment
- attaching, replacing and repairing flexible cables and plugs connected to HV electrical equipment
- connecting flexible cables and plugs to multi-phase appliances
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- inspecting and testing flexible cables, plugs and electrical equipment connected to HV electrical equipment for operation and safety
- planning and preparing to attach flexible cables and plugs connected to HV electrical equipment
- providing status reports.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- flexible cords/cables and plugs to suit given HV applications, including:
  - flexible cables and plugs to suit given HV applications
  - types of multi-phase plug HV for a specific load and ingress protection (IP) rating requirements
- safety of a HV electrical apparatus (including basic principles of its operation non-mathematical and control) of an appliance for connection to the supply, including:

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  - appropriate test equipment to check that apparatus is safe
  - procedures to be followed to ensure the correct use of test equipment
  - basic principles of operation and control of apparatus supplied by the flexible cables and plugs
  - test results that show apparatus is unsafe
- connection of flexible cables and plugs to multi-phase appliances, including:
  - preparation of flexible cables for connection to HV apparatus
  - connection of flexible cables to HV apparatus
  - connection of a HV plug to a flexible cable
- safety of flexible cable and plug assembly, including:
  - plug and cord testing procedures
  - safe operation of apparatus supplied by HV cable and plug assembly
- connection of flexible cables and plugs to multi-phase appliances
- flexible cords/cables and plugs to suit given HV applications
- problem-solving techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions
- safety of flexible cable and plug assembly
- types of multi-phase plug HV for specific load and IP rating requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to attaching flexible cables and plugs to a variety of electrical equipment connected to a HV supply

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- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0007 Disconnect-reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to isolate, disconnect and reconnect high voltage (HV) electric propulsion components on engine driven, self-propelled earth moving vehicles under the restrictions of designated electrical equipment and conditions specified, operating at 3,300 volts (V).

It includes working safely, identifying circuit and isolation arrangements, following isolation procedures, selecting and using HV testing and measuring devices, terminating and connecting HV cables and conductors, safety testing and reporting.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V alternating current (a.c.) or 120 V direct current (d.c.).

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Restricted Licensing

Unit Sector

Electrotechnology

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for disconnection or reconnection	**1.1** Designated HV electric propulsion components to be replaced are identified and purpose of the work is verified with relevant person/s
	1.2 WHS/OHS requirements and workplace procedures are followed in accordance with relevant industry standards
	1.3 Work clearances are obtained, and isolation and disconnection are followed in accordance with workplace procedures
2 Disconnect designated HV electric propulsion components	**2.1** Relevant electrical characteristics and protection specifications are identified in accordance with workplace procedures
	2.2 On-board cables are identified and marked, and connection sequence recorded
	2.3 Designated HV electric propulsion components are inspected for damage and conclusions verified with relevant person/s
	2.4 Visual inspections and checks of the designated HV electric propulsion components and associated wiring are carried out in accordance with workplace procedures to detect any abnormal or obvious damage or fault
	2.5 Isolated equipment is confirmed as de-energised
	2.6 Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
	2.7 On-board cables are disconnected, where appropriate, without damage to terminals or components
	2.8 Designated HV electric propulsion component/s are dismantled, removed and/or replaced in accordance with relevant industry standards
	2.9 Designated HV electric propulsion components parts and/or associated components are stored appropriately to

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		protect against damage
	2.10	Repairs to the removed equipment are in accordance with relevant industry standards and workplace procedures
3 Reconnect designated HV electric propulsion components	**3.1**	Cables are re-connected without damage to terminals or components
	3.2	Connections are checked and tested to confirm correct polarity and continuity
	3.3	Designated HV electric propulsion components are assembled and checked in accordance with relevant industry standards
	3.4	Designated HV electric propulsion components are inspected and tested for safety and correct operation
4 Prepare for return to service	**4.1**	Isolation devices are removed and work clearance is released in accordance with workplace procedures
	4.2	Documentation is completed in accordance with workplace procedures
	4.3	Relevant person/s is notified when designated HV electric propulsion components are ready for return to service in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Disconnecting and reconnecting of HV electric propulsion components on engine driven, self-propelled earth moving vehicles operating at 3,300 V must not include the following:	• associated electrical work other than to disconnect and reconnect of HV electric propulsion components of off-road HV electric propulsion components on engine driven, self-propelled earth moving vehicles

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operating at 3,300 V
- competencies associated with fixed wiring
- on complex electrical work
- where high fault currents are possible

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP022A Disconnect and reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0007 Disconnect-reconnect 3.3 kV electric propulsion components of self-propelled earth moving vehicles

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - hazard identification
  - using risk control measures
- dealing with unplanned events in accordance with problem-solving techniques and workplace procedures
- disconnecting and reconnecting 3.3 kilovolts (kV) electric propulsion components of self-propelled earth moving vehicles
- disconnecting of high voltage (HV) electric propulsion components
- preparing of HV electric propulsion components for return to service
- preparing to disconnect or reconnect of HV electric propulsion components of operating at 3,300 volts (V)
- providing status report/s
- reconnecting of HV electric propulsion components
- repairing in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- basic electrical circuits, including:
  - elements of a simple electric circuit (supply, control switch, protection device and load)
  - definition, the symbol and the abbreviation of the unit for electromotive force, potential difference, current and resistance
  - types of electrical load
  - need for devices to afford electrical protection and the mechanisms used in protection

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devices, including resetting
    - symbols for the components of a basic electrical circuit
    - connection of the circuit from the schematic diagram
    - alternating current (a.c.) supply (both single and three phase) and direct current (d.c.) supply
    - correct connection and use of voltmeters and ammeters, including the selection of correct range in terms of magnitude and whether the supply is a.c. or d.c.
    - need for isolating, testing and tagging electrical circuits
    - isolation, testing and tagging accessories in a simulated environment
    - connecting a simple electrical circuit including supply, control switch and load
    - measuring voltage and current within a simple circuit
- relationships in an electrical circuit, including:
    - relationship between voltage, current and resistance
    - connection of meters to determine resistance from voltmeter and ammeter readings using a variation of the Ohm s Law relationship
    - predicting changes in circuit parameters for altered values of voltage, current and resistance
    - definition of power in electrical terms (for d.c. or resistive a.c. circuits)
    - using circuit readings determine power using the appropriate equations, symbols and unit abbreviations, including the use of multiples and sub-multiples
- electrical diagrams, including:
    - symbols used for fuse, circuit breaker, isolator, normally open contacts, normally closed contacts, coil, energy meter, a.c. motor and transformer
    - using a block diagram as means of developing concepts and understanding
    - producing a block diagram of a simple circuit
    - function of single line diagrams, including their application in three phase systems
    - definition of a circuit or schematic diagrams
    - wiring diagrams
    - connecting a simple circuit using a schematic diagram noting the wide degree of variety in the way the conductors may be run
    - producing the wiring diagram of the connections used in following the schematic diagram
    - connecting a simple circuit following a wiring diagram
    - producing a schematic diagram from the wiring diagram
- test equipment selection and care, including:
    - fault currents and the implications of incorrectly connecting a meter to a high fault current source
    - category ratings of multimeters in terms of their breaking capacity (fault current interruption) and identification of the appropriate category of instrument for typical domestic work and for typical commercial work
    - regulatory requirements in regard to the maintenance and testing of test instrumentation
    - steps and procedures for the safe use, care and storage of electrical instruments

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    - selecting test equipment for given situations
- test equipment - voltage measurement, including:
    - voltage measurement-meters connected in parallel
    - operation of series test lamps
    - construction of a set of series test lamps with emphasis on safety requirements
    - using a set of series test lamps
    - operation of neon test pencils and test screwdrivers with emphasis on the limitations of their safe use
    - operation and limitations of voltage probes, including their limitations
    - using an analogue multimeter for voltage measurement ensuring the following - setting zero, correct scale; a.c or d.c., polarity and magnitude, avoiding parallax error and estimating between division readings
    - using a digital multimeter for voltage measurement ensuring the following - correct range and no active conductors are connected to any meter earth
- test equipment - resistance measurement, including:
    - voltmeter-ammeter method of resistance measurement
    - measuring resistance in a simple circuit using the voltmeter-ammeter method with emphasis on the correct choice of long or short shunt
    - measuring resistance in a simple circuit using an analogue multimeter ensuring the following - setting zero, selecting correct range and estimating of between division readings
    - measuring resistance using a digital multimeter
    - insulation resistance and list the required minimum values for insulation resistance for low voltage (LV) wiring and LV equipment (insulation resistance between active and earth the value for appliances incorporating heating elements)
    - insulation resistance needs to be measured at higher than supply voltage and the voltages to be used
    - conducting insulation resistance tests using a handheld tester after checking for zero and meter calibration
    - continuity and what a continuity tester does
    - checking the polarity of a three-core extension cord using a continuity tester
- test equipment - current measurement, including:
    - advantages of the clip-on method of current measurement
    - measuring current in a simple circuit using a multimeter on the correct current range and why a series connection must be used
    - measuring current using a clip-on (tong tester) taking each circuit conductor in turn
- cable connections, including:
    - construction of typical power cables
    - principle of operation of the following types of terminals stud, screw, tunnel, faston and soldered
    - cable preparation and terminating methods appropriate to each type of terminal, including any special requirements which apply

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    - terminating cables using all of the above terminal types employing the correct preparation and the relevant terminating tools, including the correct size soldering equipment
- protection for safety, including:
    - dangers associated with earth-faults
    - protection of persons against electric shock from earth-faults
    - maintaining a low earth-fault current path resistance
    - components in an earth-fault current path
    - testing the resistance of a fault current path
    - regulatory issues/requirements/limitations relating to working live
- safety testing preparation and procedures, including:
    - faulty earth-fault current paths
    - using safe working practices when carrying out fault-finding work
    - identification of earthing system components
    - unsatisfactory resistance of a fault current path
    - actions to rectify unsatisfactory resistance of an earth-fault current path or insulation
- isolating supplies, including:
    - regulatory requirements relating to working de-energised, and ensuring and maintaining isolation
    - reasons for advising all personnel likely to be affected
    - preventing others wanting to remake supply
    - reason for isolation and approximate time of outage to allow planning of alternate activities
    - identification the type and arrangement of circuits supplying equipment that is to be disconnected
    - availability of supply is tested at components about to be disconnected
    - locating isolation device/s, e.g. lockable adjacent isolating switch or fuse/circuit breaker at a distribution board usually identified at the appliance
    - determining the method of isolation to be used and which available device
    - isolating a supply at a fuse, the fuse wedge is removed only after the components is turned off and why the empty wedge is replaced once the fusible link has been removed
    - tests to determine if a component is turned off when isolating at a fuse/circuit breaker
    - use of and reason for danger tags at the point of isolation
    - reason for the following steps: testing on a known live supply, testing for isolation, retesting on a known live supply after confirming isolation
- disconnecting 3.3 kV electric propulsion components, including:
    - identification of the type and arrangement of circuits supplying electric propulsion components that is to be disconnected from a 3.3 kV supply
    - procedures that ensure the safe isolation of the supply to electric propulsion components which is to be disconnected
    - disconnection of isolated electric propulsion components from fixed wiring with minimal damage to wiring system after ensuring no visible faults or damage, and the recording of

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conductor connection sequence
    - termination practices relating to disconnected wiring
- reconnecting 3.3 kV electric propulsion components, including:
    - importance of checking the new electric propulsion components nameplate details against those of the electric propulsion components being replaced
    - need to visually inspect and test the electric propulsion components electrical characteristics using suitable test equipment to ensure electric propulsion components are safe to connect in regard to sufficiently high insulation resistance, arrangements for protection against indirect contact are undamaged and in place, appropriate ingress protection (IP) rating, and arrangements for protection against dangers of mechanical movement are undamaged and in place
    - compliance testing of the fixed electric propulsion components, i.e. insulation resistance and continuity
    - testing the disconnected electric propulsion components for faults (open circuits, partial open circuits, short circuits, partial short circuits and earth-faults), and any unsatisfactory test results obtained
    - procedures for electric propulsion components with unsatisfactory results - unsuitability for reconnection
    - identification of the type and arrangement of circuits supplying electric propulsion components that are to be reconnected to a 3.3 kV supply
    - procedures ensuring isolation of supply
    - process to establish the integrity of the circuit to which the disconnected electric propulsion components are to be connected
    - testing the resistance between the protective earthing conductor and neutral conductor as applicable is sufficiently low, i.e. not greater than 2 ohms
    - insulation resistance of the active conductors is greater than 1 megohm
    - engaging appropriately qualified person to rectify any non-compliance
    - appropriate cable termination practices
    - reconnection of electric propulsion components to fixed wiring with minimal damage to wiring system
    - continuity between exposed conductive parts of the electric propulsion components and the main earth or metal switchboard enclosure
    - restoring supply after ensuring correct connections, and all safety requirements have been met
    - testing the supply at electric propulsion components
    - restoring all mechanical protection, e.g. terminal covers
    - checking operation of reconnected electric propulsion components
- documentation and reports, including:
    - need to produce status reports and documents to locate and identify isolation mechanisms for a wide range of circuits and associated loads
    - production of reports and documents to use a suitable procedure to safely disconnect a component from a 3.3 kV supply
    - content required in reports and documents used to safely determine the suitability of a

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component for reconnection to supply
    - producing reports and documents for the safe reconnection/commissioning of a component to the supply
- enterprise reporting and recording system, including:
    - purpose and extent of maintaining work activities records in an enterprise
    - types of records for maintaining work activities in an enterprise
    - methods for recording and maintaining work records
    - work records for regulation requirements
    - producing enterprise records and documents for the safe reconnection/commissioning of a component to the supply
- disconnection and reconnection HV electric propulsion components on off-road earth moving trucks
- electrical circuit
- electrical diagrams
- isolating supplies
- protection for safety
- relationships in an electrical circuit
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- risk mitigation processes
- safety inspecting and testing preparation and procedures
- working de-energised and ensuring and maintaining isolation regulatory requirements.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to disconnecting and reconnecting

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3.3 kV electric propulsion components of self-propelled earth moving vehicles

- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERL0008 Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to disconnect and reconnect flameproof (Ex 'd'), increased safety (Ex 'e') and intrinsic safety (Ex 'i') electrical equipment to supply up to 1,000 volts (V) alternating current (a.c.) or 1,500 volts (V) direct current (d.c.).

It includes working safely in hazardous areas, identifying supply arrangements, following isolation procedures, handling explosion-protected equipment, selecting and using testing and measuring devices, terminating and connecting cables and conductors, safety testing, reporting electrical faults and providing status report/s.

Hazardous area is one in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment. In hazardous areas, precautions should be taken to reduce the likelihood of installed electrical equipment causing an ignition.

The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEERL0004 Disconnect-reconnect electrical equipment connected to low voltage (LV) installation wiring

Competency Field

Restricted Licensing

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Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to disconnect electrical equipment	**1.1** Electrical equipment disconnection is planned to ensure WHS/OHS policies and workplace procedures are followed
	1.2 Relevant person/s is consulted to ensure work is coordinated effectively with others
	1.3 Safety hazards which have not previously been identified are documented, risks assessed, and control measures determined and implemented in consultation with relevant person/s in accordance with workplace procedures
	1.4 Point of isolation of electrical equipment to be disconnected is determined
	1.5 Tools, equipment and testing devices required for electrical work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Disconnect electrical equipment	**2.1** WHS/OHS policies and procedures are followed
	2.2 Electrical equipment is isolated in accordance with relevant electrical installations, industry standards and workplace procedures
	2.3 Conductor connection sequence is recorded and labelled in accordance with workplace procedures
	2.4 Visual inspections and checks of the electrical equipment and associated wiring are carried out in accordance with workplace procedures to detect any abnormal or obvious damage or fault
	2.5 Isolated equipment is confirmed as de-energised

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	2.6	Electrical equipment is disconnected from fixed wiring without damage to other components
	2.7	Approval is obtained in accordance with workplace procedures from relevant person/s before any contingencies are implemented
	2.8	Disconnected conductors/cables are terminated in accordance with relevant industry standards to ensure they are safe and present no potential hazard
3 Prepare to reconnect electrical equipment	**3.1**	Reconnection is planned to ensure WHS/OHS policies and workplace procedures are followed
	3.2	Relevant person/s is consulted to ensure work is coordinated effectively with others
	3.3	Point of isolation of the circuit to which the electrical equipment is to be connected is determined
	3.4	Replacement electrical equipment is selected on the basis of rating and specifications in accordance with designated electrical equipment and conditions
	3.5	Relevant person/s is consulted in the event that replacement electrical equipment is not available
	3.6	Original and/or replacement electrical equipment is inspected and tested to ensure it is safe to connect to the electrical supply and use
	3.7	Tools, equipment and testing devices needed to carry out the electrical work are obtained in accordance with workplace procedures and checked for correct operation and safety
4 Reconnect electrical equipment	**4.1**	WHS/OHS policies and procedures are followed
	4.2	Measures are taken to ensure circuit to which electrical equipment is to be connected remains isolated and de-energised in accordance with relevant electrical installations, industry standards and workplace procedures
	4.3	Continuity of the protective earthing conductor is tested to determine whether it is sufficiently low
	4.4	Resistance between the protective earthing conductor

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		and the neutral conductor is inspected and tested to determine that it is in accordance with relevant industry standards
	4.5	Insulation resistance of active conductors is inspected and tested to confirm that it is in accordance with relevant industry standards
	4.6	Appropriate person/s is consulted to regarding any non-compliance condition identified during the earthing and resistance conductor inspection and testing
	4.7	Continuity between exposed conductive parts of the appliance and the main earth or metal switchboard enclosure is confirmed
	4.8	Electrical equipment is connected in accordance with relevant industry standards
	4.9	Connections to the electrical equipment are checked to confirm they are correct
5 Test the reconnected electrical equipment for safe operation	**5.1**	WHS/OHS policies and workplace procedures for the reinstatement of isolated circuits and electrical equipment are followed
	5.2	Arrangements are made with relevant person/s to test the operation of the electrical equipment in accordance with workplace procedures
	5.3	Operational non-conformances are identified and reported in accordance with workplace procedures
6 Identify and report faults	**6.1**	Electrical equipment is isolated in accordance with workplace procedures
	6.2	WHS/OHS policies and procedures are followed
	6.3	Visual inspection and checks of the electrical equipment to be disconnected and/or reconnected are carried out in accordance with workplace procedures to detect any abnormal or damage or fault
	6.4	Faults at point of disconnection and/or reconnection are identified and reported in accordance with workplace procedures
	6.5	Approval is obtained in accordance with workplace procedures from relevant person/s before any

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contingencies are implemented

6.6 Status report/s is completed and relevant person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Disconnecting and reconnecting equipment connected to supplies up to 1,000 V a.c. or 1,500 V d.c. explosion-protection techniques must include the following:	• flameproof (Ex 'd') • increased safety (Ex 'e') • intrinsic safety (Ex ‘i’)

MUST NOT INCLUDE
Disconnecting and reconnecting equipment connected to supplies up to 1,000 V a.c. or 1,500 V d.c. explosion-protection techniques must not include the following:
	• comprised of complex electrical apparatus and circuits:
	  • associated with fixed wiring, including locating and rectifying faults of circuits at a switchboard or to general electrical accessories (including switches, socket outlets, circuit protective devices); or
	  • installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work)
	• where high fault currents are possible
	• which are luminaries
	• in hazardous areas or on electrical equipment that is part of an explosion-protection technique

Unit Mapping Information

This unit replaces and is equivalent to UEENEEP021A Disconnect - reconnect explosion-protected appliances and control devices connected to low voltage installation wiring.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERL0008 Disconnect-reconnect explosion-protected appliances and control devices connected to LV installation

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant electrical installations industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation
- dealing with unplanned events/situations in accordance with workplace procedures to minimise risk to personnel and equipment
- determining electrical characteristics of explosion-protected electrical equipment
- disconnecting and reconnecting fixed wired electrical equipment connected to a low voltage (LV) supply
- disconnecting and reconnecting electrical equipment
- disconnecting explosion-protected electrical equipment
- identifying and isolating circuit
- identifying and reporting faults
- identifying faults at point of disconnection and reconnection in accordance with workplace procedures
- identifying point of installation
- inspecting and testing disconnected and reconnected electrical equipment for safe operation
- preparing to disconnect and reconnect electrical equipment
- preparing to disconnect explosion-protected electrical equipment
- preparing to reconnect explosion-protected electrical equipment
- reconnecting explosion-protected electrical equipment
- selecting tools, equipment and testing devices
- testing of the reconnected explosion-protected electrical equipment for safe operation, including polarity and earth continuity
- undertaking visual checks of the explosion-protected electrical equipment and associated wiring to detect and report any abnormal damage or faults.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- hazardous area safe working practices, including:
  - WHS/OHS responsibilities related to hazardous areas: the main features and purpose of a clearance to work (including hot work permit systems) system
  - typical safety procedures that should be followed before entering a hazardous area
  - the purpose of gas detectors and their use and limitations
  - effects of temperature on gas and vapour detection; frequency of monitoring for presence of gas or vapours, i.e. effects of temperature rise; factors affecting the accuracy of gas detectors, for example, contamination, condensation, temperature; and safety in use of gas detectors, for example, read and run concept
  - safety measures to be taken when working in a hazardous area
  - the roles of the parties (including standard bodies and experienced consultants) involved in the safety of hazardous areas: common Acts and regulations related to the safety of hazardous areas and the authorities responsible for their implementation; where assistance and further information can be obtained to assist persons with hazardous area responsibilities: persons with hazardous area responsibilities, including the hazardous area responsibilities of the owner of premises in which a hazardous area exists; the occupier of premises in which a hazardous area exists; enterprises and personnel engaged in installation and/or maintenance of explosion-protection systems; enterprises and personnel engaged in the classification of hazardous areas and/or design of explosion-protection systems; enterprises and personnel engaged in the overhaul, modification and/or assessment of explosion-protected equipment; enterprises and personnel engaged in the inspection of explosion-protection installations; manufacturers of explosion-protected equipment; designated authorities and insurers
- hazardous area and explosion-protection principles, including:
  - properties of combustible substances and their potential to create an explosive hazard; condition in the workplace that will lead to an explosion; the terms combustion, ignition and propagation; explosive range of substances encountered in the workplace i.e. lower explosion limit (LEL)/upper explosion limit (UEL); and explosive parameters of substances as given in tables of substance properties
  - combustible materials, including gases, vapours (from liquids) and dusts; flash point; the difference between gases and vapours; and the toxic nature of gases and vapours and potential harmful consequences
  - the nature of hazardous areas: the standard definition of a hazardous area; the recommended methods for classifying the type and degree of explosion hazard in an area; hazardous area classifications as defined by standards; and factors that are considered when a hazardous area is classified
  - the basics of how explosion-protection is achieved by the methods of exclusion, containment, energy limitation, dilution and avoidance of ignition source
- explosion-protected techniques and principles, including:
  - the principles of each explosion-protection technique, the methods used and how each

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technique works
    - how explosion-protected equipment is identified by the Ex symbol marked on the equipment, including old equipment and equipment certified in another country
    - visible conditions or actions that would void the explosion-protection provided by a particular technique
- flameproof (Ex 'd') explosion-protection technique, including:
    - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex 'd' technique (flame paths, integrity under pressure, pressure piling and enclosure entries)
    - typical situations where the Ex 'd' explosion-protection technique is used
    - actions or conditions that would void the protection provided by the Ex 'd' technique
    - the use of standards in determining the requirements to which the installation of Ex 'd' explosion-protected apparatus shall comply
- increased safety (Ex 'e') explosion-protection technique, including:
    - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex 'e' technique (temperature rise, maximum power dissipation, protection devices, certified components, creepage and clearance distances, absence of sparking contacts and enclosure entries)
    - typical situations where the Ex 'e' explosion-protection technique is used
    - actions or conditions that would void the protection provided by the Ex 'e' technique
    - the use of standards in determining the requirements to which the installation of Ex 'e' explosion-protected apparatus shall comply
- intrinsic safety (Ex 'i') explosion-protection technique, including:
    - the purpose and characteristics of the design features of apparatus and circuits protected by the Ex 'i' technique (field devices, cables, safe area devices, earthing, entity versus integrated system concept, simple devices and interface devices and their parameters, segregation, infallible components, current and voltage limiting, creepage and clearance distances)
    - typical situations where the Ex 'i' explosion-protection technique is used
    - actions or conditions that would void the protection provided by the Ex 'i' technique
    - the use of standards in determining the requirements to which the installation of Ex 'i' explosion-protected apparatus shall comply
- common characteristics of explosion-protection techniques, including:
    - the purposes of temperature classification and gas grouping/apparatus grouping
    - compliance plate markings
    - limitations of non-metallic or specific alloy enclosures
    - the purpose of conformity and certification/approval for equipment used in hazardous areas
    - environmental conditions that may impact on explosion-protection techniques
    - features and purpose of conduit seals and cable termination devices designed for use in hazardous areas (conduit seals and barrier and compression glands for cables with or without armouring, screening and/or drain wires)
- hazardous areas cable termination devices and applications, including:

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  - explosion-protection features of cable terminations devices
  - selecting compliant cable termination devices
- hazardous areas cable termination techniques, including:
  - installing conduit systems, where applicable, including seals to meet hazardous areas requirements (gases only)
  - terminating a cable with a barrier gland (gases only)
  - terminating a multipair, steel wire armoured (SWA), overall screened and individual screened cable into an enclosure
  - testing termination/connections of installed cables/circuits
- enterprise reporting and recording system, including:
  - purpose and extent of maintaining work activities records in an enterprise
  - types of records for maintaining work activities in an enterprise
  - methods for recording and maintaining work records
  - work records for regulation requirements
  - producing enterprise records and documents for the safe reconnection/commissioning of a component to the supply
- disconnect and reconnect explosion-protected electrical equipment, including:
  - common characteristics of explosion-protection techniques
  - explosion-protected techniques and principles
  - Ex ‘d’ explosion-protection technique
  - hazardous area and explosion protection principles
  - hazardous areas cable termination devices and applications
  - hazardous areas cable termination techniques
  - Ex ‘e’ explosion-protection technique
- relevant job safety assessments or risk mitigation processes, including working in hazardous areas and precautions to reduce the likelihood of electrical equipment causing an ignition
- relevant manufacturer specifications
- relevant relationships in an electrical circuit
- relevant testing equipment
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including purpose and extent of maintaining work activities records
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to disconnecting and reconnecting fixed wired explosion-protected electrical equipment connected to a LV supply
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0001 Assemble and wire internal electrical rail signalling equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to assemble and wire internal rail signalling equipment for location boxes, enclosures and equipment rooms.

It includes following workplace procedures, assembling and mounting components, performing internal wiring, terminating cables, and wiring and testing to certify equipment.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEEEL0003 Arrange circuits, control and protection for general electrical installations

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assemble and wire internal signalling	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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equipment		for work area are identified and applied
	1.2	Hazards are identified, risks assessed, and control measures and workplace procedures are implemented
	1.3	Safety hazards that have not previously been identified are noted on the job safety assessments and existing risk control measures implemented
	1.4	Technical requirements relating to specific signalling equipment are obtained
	1.5	Assembly and wiring are appropriately sequenced in accordance with job schedule
	1.6	Appropriate person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.7	Materials needed for assembly and wiring are obtained in accordance with workplace procedures and checked against job requirements
	1.8	Tools, equipment, and testing devices needed to assemble and wire equipment are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9	Rail signalling equipment is prepared for assembly and wiring in accordance with workplace procedures and relevant specifications
2 Assemble and wire internal signalling equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2	Equipment is assembled, wired, connected and labelled to comply with technical standards and job specification requirements
	2.3	Risk control measures for dealing with unplanned situations are discussed with appropriate person/s and documented in job safety assessments
	2.4	Unplanned situations are dealt with safely in a manner that minimises risk to personnel and equipment and with the approval of authorised person/s
	2.5	Equipment is assembled, wired, connected and labelled efficiently without waste of materials or damage to

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		apparatus, the surrounding environment or services using sustainable energy practices
3 Complete assembly and wiring of internal signalling equipment	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Terminations are tested in accordance with workplace testing procedures to ensure tightness and functionality
	3.3	Continuity and insulation tests are carried out in accordance with workplace test procedures to ensure and verify system standards are met
	3.4	Wiring diagrams, quality requirements and safety issues are addressed and relevant reports/documentation are updated and completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN102A Assemble and wire internal electrical rail signalling equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0001 Assemble and wire internal electrical rail signalling equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- applying relevant rail signalling regulations and codes
- applying relevant technical manuals and catalogues to workplace practices
- applying sustainable energy principles and practices
- assembling and wiring equipment to specified/technical workplace requirements
- completing the assembly and wiring of internal signalling equipment
- completing mandatory reporting
- completing relevant technical reports, records and documentation
- conducting mandatory tests and identifying non-conformance using effective workplace methods
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- ensuring assembled/wired equipment operates to specifications
- following correct testing procedures
- following relevant codes of practice, WHS/OHS and environmental protection procedures and requirements
- interpreting signalling circuit diagrams
- interpreting specifications correctly
- preparing to assemble and wire internal signalling equipment
- using appropriate tools correctly and safely.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical safe working practices and workplace procedures
- faults in inverters

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- features and characteristic of inverters under load and no-load characteristics - circuit configuration, input and output wave forms, relationship between input and output voltages and output voltage under load conditions
- hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents, including:
  - arrangement of power distribution and circuits in an electrical installation
  - parts of an electrical system and equipment that operate at LV and ELV
  - parts of an electrical system and equipment where high currents are likely
- linear and switch mode power supplies, including:
  - direct current (d.c.) to d.c. converters
  - diagnostic procedures to isolate faults
  - isolation requirements and circuitry
  - characteristics of switched mode power supplies
  - operation of step-down and step-up regulators, variable frequency and pulse width modulated regulation techniques, and switched mode power supplies
  - radiation suppression circuitry
- mechanical rail signalling principles, including:
  - overview and purpose of elements - signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, interlocking and safe working systems
- mechanical rail signalling equipment including:
  - equipment and their components, operating principles and servicing procedures
- optical fibre safety, including:
  - coherent optical sources and joining procedures
  - laser safety class 3a devices or equivalent
- rail signalling, drawings and diagrams, including layouts, conventions and symbols
- rail signalling and electro-pneumatic equipment, including operating principles and parameters, and servicing procedures
- relevant cable and equipment schedules
- relevant job safety assessments/risk mitigation processes
- relevant principles and purposes of risk management
- relevant processes for conducting a risk assessment
- relevant manufacturer specifications
- relevant rail safe working practices, protection and management
- relevant rail signalling, regulations and codes of practice
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, manuals and catalogues
- relevant workplace policies and procedures
- risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos, and other fibre reinforced switchboard materials
- risks and control measures associated with LV, including:

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  - control measures before, during and after working on electrical installations, circuits or equipment
  - control measures for working live
  - isolation and tagging-off procedures
  - risks and restrictions in working live
  - risks associated with modifying electrical installations, fault finding, maintenance and repair
- risks and control measures associated with high voltage (HV), including:
  - parts of an electrical system and equipment that operate at HV
  - terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of HV, and control measures used for dealing with the hazards of HV
- safety, selection, use, maintenance and care of test equipment, including:
  - checks and storage methods for maintaining the safety of testing devices
  - safety characteristics and safe use of electrical testing devices
- typical applications of inverters.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- relay, racks/frames/enclosures, switch circuit controllers, telephone technology and vital computer-based interlocking modules
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0002 Decommission electrical and electromechanical rail signalling from service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to decommission electrical and electromechanical rail signalling from service on rail networks.

It includes preparing to withdraw electrical and electromechanical rail signalling from service. It also includes completing disconnection of operating and redundant circuitry, equipment and components; testing of remaining circuitry and equipment; finding and repairing faults; testing of control and indicating equipment; and reporting.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0007 Install and maintain non-vital screen-based rail control systems

UEERS0008 Install and maintain non-vital telemetry systems

UEERS0004 Find and repair rail signalling system faults

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to decommission electrical and electromechanical rail signalling from service	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3 Scope of decommissioning is determined from job specifications, design drawings and regulatory requirements
	1.4 Appropriate safe working person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
	1.5 Materials needed for the safe disconnection of circuits, equipment and components are obtained in accordance with workplace procedures and checked against job specifications
	1.6 Tools, equipment and testing devices needed to disconnect circuits, equipment and components are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Withdraw electrical and electromechanical rail signalling from service	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 On-track safe working requirements are complied with in accordance with relevant industry standards and network rules
	2.3 Inspection is carried out and circuits, equipment and components are checked to ensure they are in accordance with manufacturer and system specifications
	2.4 Disconnecting, isolating and removal of redundant wiring; the termination of altered wiring; and checking indicators and signal system operation are completed in accordance with network requirements and relevant industry standards
	2.5 Methods for dealing with unplanned situations are

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		selected on the basis of safety and specified work outcomes
	2.6	Decommissioning is performed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.7	System and design faults are verified using relevant, technical information, fault-finding and diagnostic techniques to identify faulty rail signalling equipment
	2.8	Faulty rail signalling equipment is replaced, adjusted and secured in accordance with manufacturer specifications and workplace procedures
	2.9	Control equipment is adjusted, inspected and tested using workplace test procedures and equipment to ensure it operates in accordance with specified industry technical standards
3 Complete decommissioning work and reports	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	System faults are identified and reported for follow-up action in accordance with workplace procedures
	3.3	Inspection and test results are documented in accordance with workplace procedures and faulty or replaced equipment is tagged and despatched to maintain equipment spares

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEN127A Decommission electrical and electro-mechanical rail signalling from service.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0002 Decommission electrical and electromechanical rail signalling from service

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- reading and interpreting specifications correctly
- disconnecting signalling circuits, equipment and components to meet operational and technical standards
- using effective fault diagnosis and repair/replacement techniques to specified model level
- confirming circuits, equipment and components operated within specified technical parameters
- testing equipment and instruments
- using tools correctly
- following relevant codes of practice, environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- decommissioning electrical and electromechanical rail signalling from service in accordance with workplace procedures
- preparing to decommission electrical and electromechanical rail signalling from service
- withdrawing electrical and electromechanical rail signalling from service.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- electrical and electromechanical rail signalling decommissioning, safe working practices and relevant standards, codes and regulations, including:

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  - purpose of decommissioning
  - decommissioning planning and documentation
  - decommissioning requirements and hazards
  - decommissioning procedures
- fault diagnosis and repair/replacement techniques
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant safe working practices, industry standards, codes of practice, regulations and WHS/OHS legislated requirements, including decommissioning requirements and hazards
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable rail workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable rail simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to decommissioning electrical and electromechanical signalling from service
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0003 Develop rail signalling system maintenance programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to develop rail signalling system maintenance programs for rail signalling equipment and infrastructure.

It includes preparing and developing rail signalling maintenance programs, including identifying tasks and work responsibilities, and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0007 Install and maintain non-vital screen-based rail control systems

UEERS0008 Install and maintain non-vital telemetry systems

UEERS0004 Find and repair rail signalling system faults

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to develop rail signalling maintenance program	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are noted on job safety assessments, risks are assessed and risk control measures are implemented
	1.4 Maintenance program is sequenced in accordance with job schedule and specifications
	1.5 Appropriate safe working person/s is consulted to ensure maintenance work is coordinated effectively with others involved on the worksite
	1.6 Location of rail signalling equipment to be maintained is determined from job specifications and diagrams
2 Develop rail signalling equipment and infrastructure maintenance programs	**2.1** Maintenance programs are developed to cover relevant work requirements in accordance with workplace conditions and constraints
	2.2 Scheduled maintenance programs are planned and implemented
	2.3 Programs are circulated in accordance with workplace policies and procedures for review by relevant person/s
	2.4 Methods for dealing with unplanned situations are discussed with appropriate person/s and documented on job safety assessments
3 Finalise rail signalling maintenance program	**3.1** Feedback from person/s associated with the maintenance program is addressed and acceptable modifications agreed, as required
	3.2 Final rosters are documented and distributed to ensure work requirements are accurately communicated

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN126A Develop rail signalling system maintenance programs.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0003 Develop rail signalling system maintenance programs

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting specifications correctly
- checking that technical/operational specifications are met and that equipment is in compliance with work orders
- ensuring safe train movement through work area
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant WHS/OHS requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- developing rail signalling equipment and infrastructure maintenance programs, including:
  - finalising rail signalling maintenance program, roster and schedule requirements.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- rail signalling maintenance program development, safe working practices and relevant standards, codes and regulations, including:
  - maintenance principles encompassing:
    - maintenance function
    - role of maintenance department
    - WHS/OHS requirements
  - maintenance systems encompassing:

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    - maintenance terminology
    - preventative maintenance
    - predictive maintenance
    - corrective maintenance
  - data acquisition encompassing:
    - plant history cards/files
    - inspection techniques
    - predictive maintenance
    - remote visual inspection
    - non-destructive testing
    - thermography
    - vibration analysis
    - oil analysis
  - rail signalling maintenance plan development encompassing:
    - characteristics of rail signalling operation
    - assessment of failure characteristics
    - link failure characteristics to maintenance systems
    - identification of maintenance windows
    - resources
    - labour
    - materials
    - establish plan
    - implementation procedures and records
    - plan review
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant rail safe working practices, industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable rail workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable rail simulated workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing rail signalling maintenance programs
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0004 Find and repair rail signalling system faults

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to find and repair rail signalling system faults.

It includes preparing to find and repair signalling system faults, using appropriate fault-finding techniques, repairing or rectifying faults and completing reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0006 Install and maintain computer-based interlocking systems

or

UEERS0014 Install and maintain vital relay interlocking systems

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1 Prepare to find and repair rail signalling system fault/s	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Safety hazards that have not previously been identified are documented on job safety assessments, risks are assessed, and control measures determined and implemented in consultation with appropriate person/s
	1.4 Appropriate person/s is consulted to determine the nature and scope of the fault/s and to coordinate effectively with others affected by the fault/s
	1.5 Likely causes of the fault/s and order of probability are determined from system data and historical trends
	1.6 Impact of the fault on system is ascertained and appropriate person/s notified in accordance with workplace procedures
	1.7 Materials needed to find and repair the fault are obtained in accordance with workplace procedures and checked against job specifications
	1.8 Tools, equipment and testing devices needed to find and repair the fault/s are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.9 Circuits/equipment are inspected and checked as being isolated, where necessary, in strict accordance with operational procedures and WHS/OHS requirements
2 Find and repair rail signalling system faults	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Signalling system performance parameters/standards are applied to appropriate fault-finding techniques
	2.3 Inspection and tests are conducted to determine the type and location of fault/s
	2.4 Wiring system is visually inspected for physical damage or installation defects, as required

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	2.5	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.6	Ongoing inspections and checks of the signalling system are undertaken to confirm the continued rectification of the fault
	2.7	Fault/s are located and identified efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.8	Signalling system faults are rectified in accordance with workplace procedures
3 Complete repair/s to rail signalling system	**3.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	3.2	Unresolved faults are reported to appropriate person/s for further action in accordance with workplace procedures
	3.3	Inspection and test results, actions taken or recommended are documented and appropriate person/s notified in accordance with workplace procedures
	3.4	Component fault/s, test result/s, authorisation/s and permit/s documentation are completed to provide an accurate database and facilitate follow-up action and relevant reports

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEN118A Find and repair rail signalling system faults.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0004 Find and repair rail signalling system faults

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- locating and repairing three different types of rail signalling system faults, including:
  - interpreting plans and specifications correctly
  - identifying and interpreting fault history
  - identifying faults efficiently
  - rectifying faults promptly using appropriate diagnostic techniques
  - minimising interruption to rail traffic and services
  - using testing equipment and tools correctly and safely
  - confirming the integrity of the signalling system
  - following relevant codes of practice
  - completing relevant technical reports, records
  - dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- confirming fault history and symptoms through observation and application of first-line tests
- finding and repairing of the signalling system fault/s and reporting requirements
- locating and repairing rail signalling system faults.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- rail signalling system fault finding and repair, safe working practices and relevant

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standards, codes and regulations, fault-finding and diagnostic techniques encompassing:

- establishing an accurate description of the fault situation by appropriate questioning of client or operator
- questioning techniques to efficiently and effectively obtain from a client/operator a description of a fault situation
- confirming the fault history and symptoms through observation and application of first-line tests
- drawing valid conclusions from observations
- identifying concepts of broad first-line testing
- in the absence of the client or operator, to establish the symptoms through application of systematic tests and observation
- identifying appropriate diagnostic tests for given symptoms using manufacturers' charts, handbooks and specification sheets
- using results of systematic tests to identify symptoms

- rail signalling system fault finding encompassing:
  - system operational and safety requirements
  - common mechanical faults, symptoms and testing
  - common electrical faults, symptoms and testing
  - common control faults, symptoms and testing
- rail signalling system repairs encompassing:
  - system operational and safety requirements
  - fault/circuit/system isolation
  - repairing/replacing faulty components
  - component testing
  - reconnection of component/circuit/system

- relevant job safety assessments or risk mitigation processes, including:
  - possessions protection and management
- relevant industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace

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operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to locating and repairing rail signalling system faults
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0005 Install and maintain active level crossing equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain active level crossing equipment on rail networks.

It includes preparing and installing /maintaining active level crossing equipment. It also includes completing the installation/maintenance and testing active level crossing equipment.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0013 Install and maintain train detection equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install/maintain active level crossing equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied

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	1.2	Hazards are identified, WHS/OHS risks are assessed, and control measures and workplace procedures implemented in preparation for work
	1.3	Scope of installation/maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements
	1.4	Appropriate rail safe working person/s is consulted to ensure work is coordinated effectively with others to minimise rail traffic disruption
	1.5	Materials needed for the installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
	1.6	Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Install/maintain active level crossing equipment	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2	Equipment function is determined from relevant technical manuals and operating instructions to identify accessible operating requirements
	2.3	Equipment and components are cleaned, lubricated and adjusted to specified industry standards
	2.4	Equipment/component abnormalities are identified and appropriate remedial actions taken to ensure equipment conforms and performs to technical specifications
	2.5	Fit and maintenance are performed efficiently, without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.6	Equipment faults/damage are identified using efficient fault-finding and diagnostic techniques, including fault indicators, error codes and maintenance records
	2.7	Installation/maintenance are performed using appropriate tools, inspection and test equipment to ensure signalling equipment operates to required technical and operational standards

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	2.8	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and workplace requirements
	2.9	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
	2.10	Fault-finding and repairs are carried out efficiently, without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.11	Equipment is inspected, tested and adjusted using appropriate test equipment and workplace procedures to ensure it operates within the specified technical standards
	2.12	Level crossing lamp alignments are carried out as part of testing and adjusting workplace procedures, as required
3 Complete active level crossing equipment installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Equipment is taken out of service/brought back into use, as required, and documentation is completed in accordance with workplace procedures
	3.3	Work records and documentation are completed to ensure accurate maintenance records are maintained
	3.4	Worksite/equipment is reinstated in accordance with organisation requirements and faulty components are tagged, recorded and dispatched for repair/replacement

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package

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Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN107A Install and maintain active level crossing equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0005 Install and maintain active level crossing equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting specifications correctly
- using appropriate fault-finding techniques
- maintaining electrically-operated level crossing equipment to operational requirements
- organising work to minimise road and rail traffic disruptions
- using tools correctly
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant WHS/OHS requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing the installation/maintenance of active level crossing equipment
- installing/maintaining active level crossing equipment
- preparing to install/maintain active level crossing equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- active level crossing equipment installation and maintenance, safe working practices and relevant standards, codes and regulations, including:
  - rail signalling and active level crossing equipment
  - equipment and their components encompassing:

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    - flashing lights
    - audible warning devices
    - boom gate/barrier
    - pedestrian gate/barrier
    - relay operation
    - crossing predictor
    - operation alarm monitoring
    - traffic light interfaces
  - operating principles and parameters encompassing:
    - single line control
    - double line control
    - special controls
    - processor controls
    - remote alarm monitoring
    - failure modes
    - emergency operation
    - interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits
    - correct operation in accordance with control and locking tables
  - servicing procedures encompassing:
    - maintenance documentation
    - coordination/planning sequence
    - operational test procedures
    - scheduled/preventative maintenance
    - unscheduled/corrective maintenance
    - certification of active level crossing equipment (commission/decommission)
    - certifying procedures applicable for compliance with rail operator and/or enterprise standards
- rail safe systems of working
- safety management system
- safe working practices and relevant standards, codes and regulations
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures, including rail transport operator safety management system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

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Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining active level crossing equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0006 Install and maintain computer-based interlocking rail systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain computer-based electronic equipment for rail network signalling system.

It includes preparing and installing/maintaining computer-based interlocking (CBI) equipment. It also includes completing installation/maintenance of CBI systems and replacing faulty equipment requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0005 Install and maintain active level crossing equipment

UEERS0009 Install and maintain power-operated point actuating devices

UEERS0012 Install and maintain trackside signal and train protection equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to install/maintain CBI rail equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Scope of installation/maintenance work is determined from job specifications, drawings and regulatory requirements
	1.4 Materials needed for the installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
	1.5 Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Install/maintain CBI rail system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
	2.2 Reports or fault logs are identified by accessing diagnostic terminal
	2.3 Fault correction activities are prioritised by reviewing the fault reports and previous corrective actions
	2.4 Records of previously corrective actioned faults are deleted/cleared from the terminal
	2.5 Source of the fault is identified by assessing the diagnostics terminal
	2.6 Corrective action required is determined and implemented
	2.7 Appropriate mechanisms for the safe and efficient rectification of the fault are determined
	2.8 Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
	2.9 Rail system monitoring is conducted efficiently, without

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		waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.10	Replacement equipment is obtained from spare stock to comply with identified fault repair requirements
	2.11	Faulty component/equipment is identified and removed in accordance with organisation practices and procedures
	2.12	Replacement component/equipment is installed and connected to power in accordance with manufacturer specifications
	2.13	Correct test procedures are identified and implemented to confirm all operations are within specifications
	2.14	Equipment operations are monitored to ensure system integrity
	2.15	Signal and voltage levels are monitored, checked and adjusted, as required, in accordance with operational requirements
	2.16	Completed statistical records and equipment/operational management information are accurately recorded and maintained to support ongoing monitoring of systems and equipment performance
3 Complete CBI rail system installation/maintenance	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Non-conforming equipment is identified and tagged for repair type and extent of fault is identified and recorded, as required
	3.3	Faulty equipment requiring repair is segregated and appropriate records are completed in preparation for despatching to repairer
	3.4	Spare equipment stocks are reviewed to ensure adequate availability
	3.5	Priority for repair and/or replacement of equipment is determined by evaluation of stock levels and fault logs
	3.6	Work completion is documented and appropriate person/s notified of repair and replacement priorities in

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	accordance with workplace procedures and relevant reports produced

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN114A Install and maintain computer based interlocking rail systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0006 Install and maintain computer-based interlocking rail systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and includes:

- maintaining computer-based and solid-state interlocking (SSI) equipment to operational requirements, plans and specifications
- interpreting specifications and plans correctly
- using appropriate testing and fault-finding techniques
- rectifying faults with minimal disruption to rail traffic and services
- using tools and test equipment correctly
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures requirement
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant WHS/OHS requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing installation and maintenance of computer-based interlocking (CBI) system
- installing and maintaining CBI system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- CBI systems installation/maintenance
- electronic communications, principles encompassing:
  - requirements of a basic communications system - satellites, data communications, navigation, telecommunications and noise
  - antennae and electro-magnetic wave propagation

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  - reason for modulation
  - amplitude and frequency modulation, difference, advantages and disadvantages
  - simple transmitter and receiver circuits (block diagram level)
  - optical communications principles
- rail signalling - electronic equipment encompassing:
  - equipment and their components - telemetry (supervisory control and data acquisition (SCADA)), monitoring systems, IASS, train describer and panel processors
  - operating principles and parameters
  - servicing procedures
- computer peripherals encompassing:
  - types and applications
  - operating principles
  - software (drivers) installation
  - network management of peripheral devices
- personal computers (PCs), engineering applications and software basics encompassing:
  - application software types
  - configurations and preferences
  - use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, computer-aided design (CAD)/drawing packages, email, and client and business management
- rail signalling - CBI encompassing:
  - equipment and their components - SSI, Microlock and Westrace
  - operating principles and parameters
  - servicing procedures
- rail signalling - computer applications encompassing:
  - types of software and their scope - interrogator software for loggers, monitors and CBI and database (work instruction, commissioning work structures and cable schedules)
  - setting up and use
- rail signalling - remote control systems encompassing:
  - equipment and their components - programmable logic controllers (PLCs), dedicated PCs and prep systems
  - operating principles and parameters
  - servicing procedures
- electronic equipment
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- safe working practices and relevant industry standards, codes and regulations.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining computer-based and SSI systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0007 Install and maintain non-vital screen-based control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain non-vital indication screen-based control systems on rail networks.

It includes preparing and installing/maintaining non-vital screen-based control systems. It also includes completing installation/maintenance of non-vital screen-based control systems.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install/ non-vital screen-based	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	control systems		for a given work area are identified, obtained and understood
		1.2	Hazards are identified, WHS/OHS risk are assessed, and control measures and workplace procedures are followed in preparation for the work
		1.3	Scope of maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements
		1.4	Appropriate rail safe working person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
		1.5	Materials needed for installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
		1.6	Tools, equipment and testing devices needed to install/maintain work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain non-vital screen-based control systems**	**2.1**	WHS/OHS risk control measures and workplace procedures for installation/maintenance of non-vital screen-based control systems are followed
		2.2	Non-vital screen-based control systems are installed/maintained to comply with technical industry standards, job specifications and requirements
		2.3	Control system fault-finding and repairs are performed efficiently, without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices
		2.4	Control system faults are verified using relevant technical industry standard information, fault-finding and diagnostic techniques to identify faulty control equipment
		2.5	Faulty modules are replaced, adjusted and secured in accordance with manufacturer specifications and workplace procedures
		2.6	Methods for dealing with unplanned situations/events are selected on the basis of safety and specified work outcomes

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3	**Complete non-vital screen-based control system installation/maintenance**	**3.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		3.2 Control equipment is inspected, adjusted and tested using workplace test procedures and equipment to ensure system operates within specified technical industry standards
		3.3 Control system faults identified beyond the scope of first level maintenance are reported for follow-up action in accordance with workplace procedures
		3.4 Inspection and test results are documented in accordance with workplace procedures and, as required, faulty and/or replaced module/s are tagged with relevant reports

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN106A Install and maintain non-vital screen based control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0007 Install and maintain non-vital screen-based control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- reading and interpreting specifications correctly
- installing/maintaining non-vital screen-based control systems to meet operational and technical standards
- using effective fault diagnosis and repair/replacement techniques to a specified level
- confirming equipment operates within specified technical parameters
- using testing equipment, instruments and tools correctly
- following relevant codes of practice, environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying safe working practices and relevant industry standards, codes of practice and rail safety regulations
- applying sustainable energy principles and practices
- planning to install/maintain non-vital screen-based control systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- non-vital screen-based rail control system installation and maintenance, safe working practices and relevant standards, codes and regulations, including rail signalling and non-vital computer applications
- equipment and their components encompassing:
  - visual display
  - non-vital software

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- operating principles and parameters encompassing:
  - normal mode operation via indications
  - failure mode via fault reports and indications
- servicing procedures encompassing:
  - maintenance documentation
  - coordination/planning sequence
  - operational test procedures
  - scheduled/preventative maintenance
  - unscheduled/corrective maintenance
  - rail signalling and computer peripheral application
- equipment and their components encompassing:
  - visual display units
  - keyboards
  - front end processors
  - printers
- operating principles and parameters encompassing:
  - normal mode operation via indications
  - failure mode via fault reports and indications
- servicing procedures encompassing:
  - maintenance documentation
  - operational test procedures
  - scheduled/preventative maintenance
  - unscheduled/corrective maintenance
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures
- safe working practices and relevant industry standards, codes of practice and rail safety regulations
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining non-vital screen-based control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0008 Install and maintain non-vital telemetry systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain non-vital telemetry equipment and systems in a rail network.

It includes preparing and installing/maintaining non-vital telemetry system. It also includes completing the installation/maintenance of non-vital telemetry systems, repairing faults, testing telemetry equipment and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to install/ non-vital telemetry	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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	system		for a given work area are identified, obtained and clarified
		1.2	Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
		1.3	Safety hazards not previously identified are noted on job safety assessments, and risk control measures are determined and implemented
		1.4	Function of equipment is determined in accordance with operating manuals, rail system specifications and rail transport operator's interface
		1.5	Materials needed to install/maintain non-vital telemetry system are obtained in accordance with system specifications and workplace procedures
		1.6	Tools, equipment and testing devices needed to install/maintain non-vital telemetry system and diagnose the fault are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain non-vital telemetry system**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2	Installation/maintenance work is carried out in accordance with manufacturer specifications and workplace procedures
		2.3	Normal function and operating parameters are confirmed in accordance with appropriate manuals, job/manufacturer specifications and rail operator's interface
		2.4	Fault-finding and diagnostic techniques are undertaken using circuit diagrams and manufacturer specifications to verify system/faults
		2.5	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
		2.6	Installation/maintenance work is carried out efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices

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	2.7	Fault/s is isolated and assessed to determine appropriate repair method, tools, test and measurement instruments to be used
	2.8	Faulty, damaged or insecure components are replaced/repaired or secured in accordance with manufacturer/technical specifications, workplace procedures and returned to service
	2.9	Parts/components identified as suitable for replacement are replaced from available parts/component resources
	2.10	Parts/components requiring repairs beyond the repair capacity of the service centre are despatched for external repairs or disposed of in accordance with workplace procedures
	2.11	Faults are diagnosed and rectified efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.12	Repaired/replaced equipment is tested using approved test equipment in accordance with appropriate test procedures to ensure equipment is fully operational
	2.13	Test equipment is checked to ensure it is calibrated to manufacturer/technical specifications in accordance with industry standards and workplace procedures
	2.14	Appropriate adjustments and calibrations are carried out to manufacturer/technical specifications in accordance with industry standards and workplace procedures
3 Complete non-vital telemetry system installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Documentation is completed to confirm equipment has been repaired to manufacturer specifications and relevant technical reports produced
	3.3	Arrangements are made for the safe return of equipment to the customer and in accordance with workplace procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN110A Install and maintain non-vital telemetry systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0008 Install and maintain non-vital telemetry systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting plans and specifications correctly
- installing/maintaining and testing of non-vital telemetry equipment in accordance with workplace procedures
- using effective and efficient diagnostic fault-finding techniques
- using resources efficiently
- repairing equipment in accordance with workplace procedures
- ensuring repaired equipment conforms to manufacturer specifications
- calibrating and using test equipment and tools correctly
- following relevant codes of practice, environmental protection procedures and requirements
- following correct liaison procedures
- completing relevant technical reports records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing maintenance of non-vital telemetry systems
- reading mimics and animated graphics.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- non-vital telemetry systems installation/maintenance, safe working practices and relevant standards, codes and regulations, including:

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- electronic switching encompassing:
  - devices and used for electronic switching and their switching characteristic
  - circuit configuration and switch-on, switch-off conditions
  - faults in electronic switching devices/circuits
  - typical applications of electronic switching
- using supervisory control and data acquisition systems (SCADA) encompassing:
  - SCADA system features and applications
  - industries in which SCADA systems are used
  - associate benefits of the package
  - features and facilities of different SCADA packages
  - hardware requirements
- transmission protocols encompassing:
  - carriers
  - multidrop configuration
  - time division multiplexing
  - relay and computer-based interlocking (CBI) interfaces
  - data structure
- elements, including addressing, parity, cyclic redundancy check, direction control data and indication data
- reading mimics and animated graphics
- trending
- analysis of process to select data
- viewing data and graphical representation of selected information
- trend graphs and data matching
- alarm logging
- analysing select data
- corrective action of alarm status
- safe working practices and relevant standards, codes and regulations
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- servicing procedures, including:
  - maintenance documentation
  - coordination/planning sequence
  - operational test procedures
  - scheduled/preventative maintenance
  - unscheduled/corrective maintenance
  - relevant rail transport operator certifying train detection equipment (commission and

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decommission) workplace procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining non-vital telemetry systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0009 Install and maintain power-operated point actuating devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain power-operated point actuating devices in rail networks.

It includes preparing and installing/maintaining power-operated point actuating devices. It also includes completing installation/maintenance of power-operated point actuating device, performing operational tests and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0013 Install and maintain train detection equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install/maintain power-operated point actuating device**	**1.1** Work health and safety (WHS)/Occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
		1.2 Hazards are identified, WHS/OHS risks are assessed, control measures and workplace procedures are implemented in preparation for work
		1.3 Scope of the installation/maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements
		1.4 Appropriate rail safe working personnel are consulted to ensure work is coordinated effectively with others involved on the worksite
		1.5 Materials needed for the installation/maintenance are obtained in accordance with workplace procedures and checked against job specifications
		1.6 Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain power-operated point actuating device**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2 Installation/maintenance, cleaning, brushing and lubricating work are carried out on point actuating devices in accordance with technical and operational specifications
		2.3 Adjustments to point actuating devices are made to ensure correct operation, and perway fastenings and timbers are inspected in accordance with operational specifications
		2.4 Position and mounting of point actuating devices are checked in accordance with site layout and operational specifications
		2.5 Installation/maintenance is performed efficiently, without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices

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	2.6	Function of equipment is determined from technical data, maintenance handbooks, workplace and equipment operating procedures
	2.7	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with technical and manufacturer specifications to ensure operational effectiveness
	2.8	Equipment is inspected and tested in accordance with workplace testing procedures to ensure operational and technical requirements are achieved
	2.9	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
3 Complete power-operated point actuating device installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Documentation is completed to provide an accurate installation/maintenance record and Network Control Officer informed of work status details
	3.3	Reusable, faulty or worn components are tagged and despatched for repair to maintain adequate spares
	3.4	Faulty perway conditions/components are documented to provide details for corrective/follow-up action
	3.5	Point actuating devices are temporarily taken out of service, instated back into service and certified in accordance with organisation requirements and workplace procedures
	3.6	Maintenance work activities are recorded in accordance with organisation requirements to provide accurate records and produce relevant reports

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN108A Install and maintain power operated point actuating devices.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0009 Install and maintain power-operated point actuating devices

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting plans and specifications correctly
- maintaining point actuating devices to operational requirements
- using appropriate fault-finding techniques
- documenting perway defects accurately
- using tools correctly
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety **(**OHS) and environmental protection procedures and requirements, including:
    - implementing workplace procedures and practices
    - using risk control measures
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying sustainable energy principles and practices
- completing the installation/maintenance of power-operated point actuating devices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- power-operated point actuating device installation/maintenance, safe working practices and relevant standards, codes and regulations, including:
    - rail signalling principles - electrical
    - overview of electrical rail signalling encompassing:
        - types of rail signalling/safe working systems, including centralised traffic control (CTC), automatic, controlled and interlocked signalling
        - advantages of electrical over mechanical signalling

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- advantages of computer-based interlocking (CBI) over electrical signalling systems
- effects of overhead traction systems on electrical signalling systems (where applicable)
- purpose of elements of an electrical rail signalling system, including signals and aspect systems, train protection systems, point actuating systems, mechanical locking, relay interlocking, CBI, train detection systems, control input devices, indicators, diagrams and monitors, and safe working systems

- rail signalling principles - mechanical
- overview of mechanical rail signalling encompassing:
  - types of mechanical rail signalling systems for different rail traffic, including passenger train, freight train, maintenance vehicles and heritage/tourism train
  - deficiencies of mechanical signalling systems, including automatic, controlled and interlocked signalling
  - effects of overhead traction systems on mechanical signalling systems (where applicable)
  - effects of external factors on the mechanical rail signalling system, including rail overhead, gradients/terrain, environmental and civil configuration
  - purpose of elements of a mechanical rail signalling system, including signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, mechanical interlocking frames, safe working systems and electro-mechanical interfaces
- rail signalling - point actuating devices
- equipment and their components encompassing:
  - point actuating mechanisms, including mechanical, pneumatic, hydraulic and electric powered units
  - blade and operation detection devices
  - on-rail locking devices
  - off-rail locking devices
  - swing nose devices
  - ironwork and fixtures
  - equipment, including point machines, detectors, claw/clamp locks, swing nose mechanisms and in-bearer mechanisms
- operating principles encompassing:
  - point operation, normal and reverse
  - point locking, normal and reverse
  - point detection, normal and reverse
  - detectors
  - off-rail locking operation
  - on-rail locking operation
  - electric operation of contactors, motor control and detection circuits
  - interpreting circuit diagrams to evaluate correct operation and relationship to other signalling circuits

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    - normal mechanical movement
    - failure mode mechanical movement, including wrong side and right-side conditions identifying if movement should be possible
    - correct operation in accordance with control and locking tables
  - servicing procedures encompassing:
    - maintenance documentation
    - coordination/planning sequence
    - operational test procedures
    - scheduled/preventative maintenance
    - unscheduled/corrective maintenance
    - certifying point equipment (commission and decommission)
    - certifying procedures applicable for compliance with rail operator/enterprise standards
- safe working practices and relevant standards, codes and regulations
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures, including rail transport operator safety management system.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining onsite power-operated point actuating devices
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0010 Install and maintain rail signalling power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain rail signalling power supplies.

It includes preparing and installing/maintaining rail signalling power supplies by working safely to installation/maintenance industry standards, matching equipment with that specified for location, terminating cables and connecting wiring compliance, functional testing, certifying and reporting.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0001 Assemble and wire internal electrical rail signalling equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to	**1.1** Work health and safety (WHS)/occupational health and

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	install/maintain rail signalling power supplies		safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
		1.2	Hazards are identified, risks assessed, and control measures and workplace procedures implemented
		1.3	Safety hazards which have not previously been identified are noted on job safety assessments and risk control measures are implemented
		1.4	Scope of work and location of power supply are determined by site inspection and from job instructions, specifications and/or diagrams
		1.5	Materials needed for the installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
		1.6	Tools, equipment and testing devices needed to install/maintain power supplies are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain rail signalling power supplies**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2	Power supply is checked to comply with technical industry standards, job specifications and requirements
		2.3	Wiring is run and cables terminated to comply with technical industry standards, job specifications and requirements
		2.4	Inspection and tests are conducted to ensure installed/maintained power supply complies with job specifications and functions as intended
		2.5	Installation/maintenance of power supply is carried out efficiently, without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices
		2.6	Correct functioning of equipment is established from reference to manuals, system specifications and commissioning data
		2.7	Faults are identified in accordance with relevant technical information of power supplies and

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		fault-finding techniques
	2.8	Faulty, worn, damaged or insecure components are replaced, repaired or secured in accordance with manufacturer specifications and workplace procedures
	2.9	Existing methods for dealing with unplanned situations are discussed with appropriate person/s and documented in accordance with workplace procedures
3 Complete rail signalling power supplies installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with workplace procedures
	3.3	Work completion is documented and appropriate person/s notified in accordance with workplace procedures and relevant reports produced

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN105A Install and maintain rail signalling power supplies.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0010 Install and maintain rail signalling power supplies

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- interpreting specifications and circuit diagrams correctly
- installing/maintaining power supplies correctly
- using appropriate diagnostic and fault-finding techniques
- using tools and test instruments correctly
- following relevant codes of practice, procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing installation/maintenance of rail signalling power supplies
- planning installation/maintenance of rail signalling power supplies.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- rail signal power supply installation/maintenance, safe working practices and relevant standards, codes and regulations for basic rail operations, including:
  - rail terminology encompassing:
    - rail signalling nomenclature
    - rail signalling symbols
    - state/territory standards
    - standard glossary of terms relevant to each state/territory and where the standard originated from and how new standards are developed to meet a national standard
  - train dynamics encompassing:

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    - types of rail vehicles, including suburban/country passenger, freight, maintenance vehicles and heritage/tourism
    - braking distance
    - gradients/terrain
    - sighting distance
    - the relationship to the signalling arrangement plan/scheme
- essentials of safe movement of trains encompassing:
    - the role of the signalling system in enabling safe and efficient movement of trains
    - standard operating conditions as per operating timetable/schedule
    - degraded signalling system performance, including a partial failure of signalling infrastructure or a system override
- abnormal train operating conditions, including signaller operation error, driver operation error, train delayed and train breakdown
- emergency train and signal system operation
- scheduled infrastructure maintenance
- unscheduled infrastructure maintenance, including civil, signalling, traction and overhead
- purpose of rail signalling encompassing:
    - safe distances between rail vehicles
    - safe movement of rail vehicles
    - conflicting movement between rail vehicles
    - how the signalling system provides driver information
    - how the driver interprets the information to safely control a train
    - restrictions on the signaller and driver following an operation error, including signals passed at stop, driver exceeding speed requirement and signaller setting incorrect route
- enterprise work activities records
- purpose and extent of maintaining work activities records in an enterprise
- types of records for maintaining work activities in an enterprise
- methods for recording and maintaining work records
- work records required by regulation requirements
- environmental and heritage awareness
- purpose of environmental and heritage regulation
- typical issues affecting electrotechnology services and systems
- meeting requirements
- rail signalling, power supplies
- equipment and their components encompassing:
    - transformers
    - batteries
    - converters
    - inverters

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    - uninterruptable power supplies (UPS)
    - generator
    - solar panels
    - earthing
    - surge protection
    - switchboards
    - high voltage (HV) and low voltage (LV) power distribution
    - automatic power changeover panels
    - wiring and termination
- operating principles and parameters encompassing:
    - normal mode operation
    - alarm mode
    - redundancy mode
    - power interruption/standby mode
    - interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits
- servicing procedures encompassing:
    - maintenance documentation
    - coordination/planning sequence
    - operational test procedures
    - scheduled/preventative maintenance
    - unscheduled/corrective maintenance
    - certifying power supply equipment (commission and de-commission), including certifying procedures applicable for compliance with rail operator and/or enterprise standards
- safe working practices and relevant standards, codes and regulations
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining rail signalling power supplies
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0011 Install and maintain rail track circuit leads and bonds

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain track circuit leads and bonds of rail signalling electrical power and control systems.

It includes following workplace procedures, job planning, running and positioning, connecting track leads and bonds, maintaining and testing track leads and bonds, and completing required documentation.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0001 Assemble and wire internal electrical rail signalling equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install/maintain track circuit leads and bonds**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for work area are identified, obtained and applied
		1.2 Hazards are identified, risks assessed, and control measures and workplace procedures implemented
		1.3 Safety hazards that have not previously been identified are noted on job safety assessments and existing risk control measures implemented
		1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
		1.5 Installation/maintenance instructions are reviewed to obtain clear and concise work requirements
		1.6 Site bonding layout plan is reviewed to clarify bonding requirements
		1.7 Material to install/maintain track circuit leads and bonds is obtained in accordance with workplace procedures and checked against job specifications
		1.8 Tools, equipment and testing devices to install/maintain track circuit leads and bonds are obtained in accordance with workplace procedures and checked for correct operation and safety
		1.9 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with job specifications
2	**Install/maintain track circuit leads and bonds**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2 Specified leads of bonds are run and positioned appropriately to the formation conditions and to minimise potential damage from track maintenance machines
		2.3 Installation/maintenance of track circuit leads and bonds are appropriately sequenced in accordance with job schedule
		2.4 Positions of boxes and cable pits are checked to ensure compliance with specifications and appropriate follow-up action is initiated, as required

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	2.5	Components and rail surfaces are prepared to ensure secure and sound connections in accordance with job specifications
	2.6	Leads or bonds are connected using specified fastening techniques ensuring technical compliance is achieved
	2.7	Established methods for dealing with unplanned situations are discussed with appropriate person/s and documented in accordance with workplace procedures
	2.8	Unplanned situations are dealt with safely in a manner that minimises risk to personnel and equipment and with the approval of an authorised person
	2.9	Track circuit leads and bonds are installed and connected efficiently without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.10	Bonds, leads and rail connections are inspected for damage or deterioration and appropriate corrective action is initiated in accordance with workplace procedures
	2.11	Appropriate tests are completed to identify components requiring repair or replacement in accordance with workplace procedures and job specifications
	2.12	Repair or replacement of components is carried out with due regard to train movements and safety of person/s involved
	2.13	Temporary bonding is installed, as required, and electrical readings on bonds/lead connections and insulated rail joints are taken to ensure compliance with specifications and site bonding layout plan
	2.14	Track-related equipment is inspected for faults or damage and all faults are documented and appropriate follow-up action is initiated in accordance with workplace procedures
3 Complete installation/maintenance of track circuit leads and bonds	**3.1**	WHS/OHS risk control, work completion measures and workplace procedures are followed
	3.2	Worksite is cleaned and made safe in accordance with

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workplace procedures

3.3 Work completion is documented, relevant reports produced and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN103A Install and maintain rail track circuit leads and bonds.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0011 Install and maintain rail track circuit leads and bonds

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying bonding techniques correctly
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements
- applying safe working practices, rules and relevant industry standards, codes of practice and regulations
- completing installation/maintenance of track circuit leads and bonds
- completing relevant technical reports, records and documentation
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- ensuring bonds and leads testing and test results comply with technical requirements
- following relevant codes of practice, WHS/OHS and environmental procedures and requirements
- installing/maintaining track circuit leads and bonds correctly
- interpreting relevant diagrams and track insulation plans
- interpreting specifications correctly
- preparing to install/maintain track circuit leads and bonds
- selecting and using tools correctly.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- abnormal train operating conditions
- basic rail operations
- braking distance
- emergency train and signal system operation
- environmental and heritage awareness, including the purpose for regulation
- gradients/terrain

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- methods for recording and maintaining work records and documentation
- relevant rail terminology, including signalling nomenclature, signalling symbols and terms relevant to each state or territory
- relationship to the signalling arrangement plan/scheme
- relevant enterprise work activities records
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant purpose of rail signalling, including:
  - conflicting movement between rail vehicles
  - driver interprets the information to safely control a train
  - emergency train and signal system operation
  - safe distances between rail vehicles
- safe movement of rail vehicles and trains, including
  - degraded signalling system performance
  - role of rail signalling system in enabling safe and efficient movement of trains
  - standard operating conditions as per operating timetable/schedule
  - signalling system provides driver information
  - signalling system restricts the signaller and driver following an operation error
- relevant scheduled and unscheduled infrastructure maintenance requirements
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- train dynamics including types of rail vehicles
- tail track circuit leads and bonds installation and maintenance
- typical issues/faults affecting rail electrotechnology services and systems
- sighting distance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0012 Install and maintain trackside signal and train protection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain trackside signal and train protection equipment.

It includes preparing and installing/maintaining trackside signal and train protection equipment. It also includes completing installation/maintenance of trackside signal and train protection equipment and repairing faults, performing operational tests and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0013 Install and maintain train detection equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install/maintain trackside signal and train protection equipment**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
		1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
		1.3 Safety hazards that have not previously been identified are documented as part of the job safety assessments, and risk control measures are determined and implemented in consultation with appropriate person/s
		1.4 Appropriate rail safe working person/s is consulted to ensure work can proceed without delaying or compromising rail operational safety of train movements
		1.5 Materials needed for the installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
		1.6 Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain trackside signal and train protection equipment**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2 Signal and train protection equipment are checked in accordance with job and technical specifications
		2.3 Sub-assemblies of signal and train protection equipment are assembled in accordance with work/job specifications and checked to confirm circuit integrity
		2.4 Assembled sub-assemblies are inspected and tested off-site, where possible, in accordance with job and technical specifications
		2.5 Installation/maintenance, wiring and assembly of signal and train protection equipment are completed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices

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	2.6	Signal and train protection components and sub-assemblies are inspected, checked and installed in accordance with job specifications
	2.7	Component and wiring test/s are conducted under live test conditions to ensure train protection equipment functions correctly
	2.8	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
	2.9	Installation/maintenance work is carried out in accordance with manufacturer specifications, workplace procedures and relevant industry standards
	2.10	Appropriate operational inspection and test procedures are applied to ensure equipment and components are operational
	2.11	Signal/s and train protection equipment are monitored, inspected and tested to ensure they operate in accordance with technical parameters specified and job specifications
	2.12	Testing is performed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete trackside signal and train protection equipment installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Worksite is made safe in accordance with workplace safety management procedures
	3.3	Test results and documentation are completed to confirm system operational compliance to job specifications and relevant reports produced
	3.4	Work completion is documented and appropriate rail safety person/s notified in accordance with workplace safe working procedures

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN111A Install and maintain trackside signal and train protection equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0012 Install and maintain trackside signal and train protection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- interpreting specifications and circuit diagrams correctly
- using appropriate fault-finding techniques
- installing/maintaining trackside signal and train protection equipment to operational requirements
- organising work to minimise traffic disruptions
- using tools and test equipment correctly
- following relevant codes of practice and environmental protection procedures and requirements
- completing relevant technical reports and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing installation/maintenance of trackside signal and train protection equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- trackside signal and train protection equipment installation/maintenance, safe working practices and relevant standards, codes and regulations, including:
  - rail signalling principles - electrical
  - overview of electrical rail signalling encompassing:
    - types of rail signalling/safe working systems including computer-based interlocking (CBI), automatic, controlled and interlocked signalling

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    - advantages of electrical over mechanical signalling
    - advantages of CBI over electrical signalling systems
    - effects of overhead traction systems on electrical signalling systems (where applicable)
    - purpose of elements of an electrical rail signalling system, including signals and aspect systems, train protection systems, point actuating systems, mechanical locking, relay interlocking, CBI, train detection systems, control input devices, indicators, diagrams and monitors, and safe working systems
    - rail signalling principles - mechanical
- overview of mechanical rail signalling encompassing:
    - types of mechanical rail signalling systems for different rail traffic, including passenger train, freight train, maintenance vehicles and heritage/tourism train
    - deficiencies of mechanical signalling systems, including automatic, controlled and interlocked signalling
    - effects of overhead traction systems on mechanical signalling systems (where applicable)
    - effects of external factors on the mechanical rail signalling system, including rail overhead, gradients/terrain, environmental and civil configuration
- purpose of elements of a mechanical rail signalling system encompassing:
    - signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, mechanical interlocking frames, safe working systems and electro-mechanical interfaces
    - rail signalling and signal equipment
- equipment and their components encompassing:
    - incandescent lamps
    - light-emitting diode (LED) lamps
    - electro-mechanical
    - mechanical
    - interfacing to different interlocking systems, e.g. relay and CBI
- operating principles and parameters encompassing:
    - automatic signal control circuits
    - controlled signal control circuits
    - approach control circuits
    - bi-directional block control circuits
    - lamp proving circuits
    - failure mode
    - interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits
    - correct operation in accordance with control and locking tables
- servicing procedures encompassing:
    - maintenance documentation

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    - coordination/planning sequence
    - operational test procedures
    - scheduled/corrective maintenance
    - unscheduled/preventative maintenance
    - certifying signal equipment (commission and de-commission)
    - certifying procedures applicable for compliance with rail operator/enterprise standards
  - rail signalling, train protection equipment
  - equipment and their components encompassing:
    - electro-mechanical (e.g. train-stops)
    - electro-magnetic (e.g. automatic warning system (AWS))
    - electronic (e.g. train protection warning system (TPWS))
    - automatic train protection (ATP) system - Balise/beacon based (e.g. ETCS level 1, and Westect)
  - operating principles encompassing:
    - permissive operation
    - restrictive operation
    - failure modes
    - interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits
    - correct operation in accordance with control and locking tables
- safe working practices and relevant standards, codes and regulations
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective

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equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining trackside signal and protection equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0013 Install and maintain train detection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain train detection equipment in a rail network.

It includes preparing and installing/maintaining train detection equipment. It also includes completing the installation/maintenance of train detection equipment and repairing faults, performing operational tests and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0010 Install and maintain rail signalling power supplies

UEERS0011 Install and maintain rail track circuit leads and bonds

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install/maintain train detection equipment**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
		1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
		1.3 Scope of the installation/maintenance is determined from maintenance schedules, job specifications, drawings and regulatory requirements
		1.4 Appropriate rail safe working person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
		1.5 Materials needed for the installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
		1.6 Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain train detection equipment**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2 Installation/maintenance work is carried out in accordance with manufacturer specifications and workplace procedures
		2.3 Normal function and operating parameters are confirmed in accordance with appropriate manuals, job specifications and commissioning data
		2.4 Fault-finding and diagnostic techniques are used to verify system/faults
		2.5 Faulty, damaged or insecure components are replaced/repaired or secured in accordance with manufacturer specifications and workplace procedures
		2.6 Installation/maintenance, adjusting and testing work is carried out efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices

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	2.7	Appropriate readings are measured and recorded using relevant test instruments
	2.8	Equipment is tested and adjusted in accordance with manufacturer specifications, workplace and equipment operating procedures
	2.9	Equipment operational inspections and tests are completed in accordance with job specifications and workplace procedures
	2.10	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
3 Complete train detection equipment installation/maintenance	**3.1**	WHS/OHS risk control work completion measures and workplace procedures are followed
	3.2	Calibration of equipment is verified and equipment is confirmed by functional tests in accordance with workplace and equipment operating procedures
	3.3	Work completion is documented and appropriate rail safe working person/s notified in accordance with workplace procedures and relevant reports produced

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN109A Install and maintain train detection equipment.

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Links

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Assessment Requirements for UEERS0013 Install and maintain train detection equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting plans and specifications correctly
- installing/maintaining, adjusting and testing equipment in accordance with workplace procedures
- using tools and test equipment safely
- checking that technical operational specifications are met and equipment is in compliance with work orders
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety **(**OHS) and environmental protection procedures and requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- completing the installation/maintenance of train detection equipment
- preparing to install/maintain train detection equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- train detection equipment installation and maintenance, safe working practices and relevant standards, codes and regulations, including:
  - rail signalling, train detection equipment
  - train detection equipment and their components encompassing:
    - track circuits, including jointed, jointless, non-vital, axle counters, treadles and level crossing predictors
    - alternating current (a.c.) and direct current (d.c.) power supplies

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    - transmitters
    - receivers
    - relays
    - track shunts
    - tuned joint couplers
    - central processor
    - diagnostics
    - fixtures to ironwork
- operating principles and parameters encompassing:
    - interpreting circuits diagrams to evaluate correct operation and relationship to other signalling circuits
    - normal mode operation:
        - instantaneous coil energisation and delay pick-up
        - wrong-side operation
        - failure mode operation, including wrong-side and right-side conditions
    - alarm mode
    - redundancy mode
    - correct operation in accordance with control and locking tables
    - servicing procedures encompassing:
        - maintenance documentation
        - coordination/planning sequence
        - operational test procedures
        - scheduled/preventative maintenance
        - unscheduled/corrective maintenance
        - certification of train detection equipment (commission and decommission)
        - certifying procedures applicable for compliance with rail operator and/or enterprise standards
- safe working practices and relevant standards, codes and regulations
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do

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so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining train detection equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0014 Install and maintain vital relay interlocking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to install/maintain vital relay interlocking systems in a rail network.

It includes preparing and installing/maintaining vital relay interlocking system. It also includes completing the installation/maintenance of vital relay interlocking system, repairing system faults, performing operational tests and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0005 Install and maintain active level crossing equipment

UEERS0009 Install and maintain power-operated point actuating devices

UEERS0012 Install and maintain trackside signal and train protection equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Prepare to install/maintain vital relay interlocking system**	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
		1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
		1.3 Scope of installation/maintenance work is determined from job specifications, drawings and regulatory requirements
		1.4 Appropriate rail safe working person/s is consulted to ensure work is coordinated effectively with others to minimise traffic disruptions
		1.5 Materials needed for installation/maintenance work are obtained in accordance with workplace procedures and checked against job specifications
		1.6 Tools, equipment and testing devices needed for installation/maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Install/maintain vital relay interlocking system**	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
		2.2 Visual inspection of installation wiring and equipment is carried out to identify damaged or faulty equipment
		2.3 Damaged or faulty component/s identified during inspection is replaced in accordance with technical instructions, manufacturer specifications and workplace maintenance procedures
		2.4 Installation/maintenance is performed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
		2.5 Systems are investigated using appropriate fault-finding and diagnostic techniques to identify faults
		2.6 Fault circuit indicators and maintenance records are used to assist in the identification of electrical faults
		2.7 Repairs, replacement and/or adjustment of

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		equipment/systems are carried out using appropriate tools and test equipment to ensure equipment/systems function to relevant technical and operational standards
	2.8	Faulty, worn, damaged or insecure components are repaired/replaced or secured whilst ensuring system safety integrity is maintained in accordance with technical and/or manufacturer specifications
	2.9	Methods for dealing with unplanned situations are determined on the basis of safety and specified work outcomes
	2.10	Vital relay interlocking system is inspected and tested in accordance with workplace test procedures and relevant equipment is used to ensure it operates within specified technical parameters
3 Complete vital relay interlocking system installation/maintenance	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Reusable, faulty and worn components are tagged and despatched for repair in accordance with workplace procedures
	3.3	Maintenance work activities are recorded in accordance with workplace procedures and organisation requirements
	3.4	Documentation, including component faults test results, authorisations and permits, is completed to provide an accurate database and facilitate follow-up action and relevant reports produced

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEENEEN112A Install and maintain vital relay interlocking systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0014 Install and maintain vital relay interlocking systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting plans and specifications correctly
- using appropriate fault-finding techniques
- installing/maintaining vital relay interlocking systems to operational requirements
- organising work to minimise rail traffic disruptions
- using tools correctly
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant WHS/OHS requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing installation/maintenance of vital relay interlocking systems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- vital relay interlocking systems installation/maintenance, including:
  - rail signalling, interlocking systems - electrical
  - equipment and their components encompassing:
    - power supplies
    - relays - timers
    - relays - latching/delatching

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    - relays - line
    - relays - biased
    - signaller controls/indications
    - geographic modules
    - mechanical interface
- operating principles and parameters encompassing:
    - normal mode operation
    - route selection circuits
    - signal approach circuits and timers
    - point release circuits and timers
    - panel indications and circuits
    - wrong-side protection mode
    - alarm mode
    - emergency operation
    - correct operation in accordance with control and locking tables
- servicing procedures encompassing:
    - maintenance documentation
    - coordination/planning sequence
    - operational test procedures
    - scheduled/preventative maintenance
    - unscheduled/corrective maintenance
    - certifying interlocking equipment (commission and decommission)
- certifying procedures applicable for compliance with rail operator and/or enterprise standards
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace policies and procedures
- safe working practices and relevant industry standards, codes and regulations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing/maintaining power signalling and protective relay interlocking systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0015 Maintain electronic and microprocessor-based remote control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain electronic and microprocessor-based remote control systems for a rail network signalling system.

It includes preparing and maintaining electronic and microprocessor-based remote control system. It also includes completing electronic and microprocessor-based remote control system maintenance and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0007 Install and maintain non-vital screen-based rail control systems

UEERS0008 Install and maintain non-vital telemetry systems

UEERS0004 Find and repair rail signalling system faults

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to maintain electronic and microprocessor-based remote control system	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures are implemented in preparation for work
	1.3 Maintenance program/fault/irregularity reports are reviewed to determine work priorities, resources, logistics and site information
	1.4 Appropriate person/s is consulted to ensure work is coordinated effectively with others affected by the work and authorisations are obtained in accordance with workplace procedures
	1.5 Materials needed for the work are obtained in accordance with workplace procedures and checked against job specifications
	1.6 Tools, equipment and testing devices needed for work are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Maintain electronic and microprocessor-based remote control system	**2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
	2.2 Equipment inspection and checks are carried out to ensure performance is in accordance with operational specifications
	2.3 Security of fittings, terminations and mountings are inspected, checked and adjusted, as required, for compliance in accordance with job specifications
	2.4 Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.5 Maintenance work is performed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices

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	2.6	Appropriate operating parameters are ascertained from job specifications and commissioning data to enable performance checks to be completed
	2.7	Appropriate fault-finding and diagnostic techniques are used to verify symptoms or irregularities
	2.8	Symptoms are reproduced, monitored and documented, as required
	2.9	System is adjusted and operationally tested in accordance with industry technical standards and design specifications
	2.10	Appropriate conclusions are determined from fault indicators, error codes, maintenance records and print-outs to assist fault finding
	2.11	Appropriate technical support is obtained, as required
	2.12	Faulty components are replaced or repaired in accordance with workplace procedures
	2.13	Components are terminated, connected system levels adjusted and parameters set in accordance with job specifications
3 Complete electronic and microprocessor-based remote control system maintenance and report/s	**3.1**	WHS/OHS completion risk control work measures and workplace procedures are followed
	3.2	System is functionally inspected and tested in accordance with specified job parameters and industry standards
	3.3	Maintenance documentation is completed, as required, and equipment is labelled, packaged and returned to service, as required

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN116A Maintain electronic and microprocessor-based remote control systems.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0015 Maintain electronic and microprocessor-based remote control systems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- interpreting specifications, circuit diagrams and workplace procedures correctly
- using appropriate diagnosis and fault-finding techniques to sub-module level
- maintaining electronic switched and microprocessor-based remote control systems to operational requirements (to sub-module level)
- working efficiently and effectively
- using tools and test equipment correctly
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant WHS/OHS requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices
- completing maintenance and reporting of electronic and microprocessor-based remote control system.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- rail signalling remote control system maintenance, safe working practices and relevant standards, codes and regulations, including:
  - maintenance principles encompassing:
    - maintenance function
    - role of maintenance department

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    - WHS/OHS requirements
- maintenance systems encompassing:
    - maintenance terminology
    - preventative maintenance
    - predictive maintenance
    - corrective maintenance
- data acquisition encompassing:
    - plant history cards/files
    - inspection techniques
    - predictive maintenance
    - remote visual inspection
    - non-destructive testing
    - thermography
    - vibration analysis
    - oil analysis
- rail signalling maintenance plans encompassing:
    - characteristics
    - maintenance windows
    - required resources (labour and materials)
    - procedures and records
    - maintenance of rail signalling electronics and microprocessor-based remote control systems
    - components requiring maintenance
- rail safe working practices encompassing:
    - rail enterprise safety standard and procedures
    - rail safe working requirements
    - possessions protection and management
- WHS/OHS requirements
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the

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time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to maintaining electronic switched and microprocessor-based remote control systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0016 Maintain mechanical rail signalling equipment and infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to maintain mechanical rail signalling and infrastructure connected to electromechanical equipment.

It includes preparing, carrying out and completing the maintenance of mechanical rail signalling equipment and infrastructure.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare mechanical signalling equipment and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are

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	infrastructure		identified, obtained and applied
		1.2	Hazards are identified, risks assessed and control measures and workplace procedures implemented
		1.3	Safety hazards that have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
		1.4	Maintenance is sequenced in accordance with job specification
		1.5	Appropriate rail safe working person/s is consulted to ensure work is coordinated effectively with others involved on the worksite
		1.6	Location of equipment to be maintained is determined from job specifications and diagrams
		1.7	Materials needed for maintenance are obtained in accordance with workplace procedures and checked against job specification
		1.8	Tools, equipment and testing devices needed to conduct maintenance work are obtained in accordance with workplace procedures and checked for correct operation and safety
2	**Carry out mechanical signalling equipment and infrastructure maintenance**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed
		2.2	Chemicals, lubricants and consumables are used and disposed of in accordance with material safety data sheets (MSDS)/safety data sheets (SDS) and WHS/OHS codes of practice
		2.3	Rubbish, weeds and obstructions are removed from equipment and housings
		2.4	Visual inspections and checking of operational equipment are performed to identify any equipment faults
		2.5	External surfaces are prepared/painted in accordance with organisational standards to protect equipment
		2.6	Internal surfaces and operational components are cleaned and lubricated to ensure operational

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		effectiveness
	2.7	Maintenance is carried out in accordance with relevant industry standards and workplace procedures
	2.8	Existing methods for dealing with unplanned situations are discussed with appropriate person/s and documented in accordance with workplace procedures
	2.9	Unplanned situations are dealt with safely in a manner that minimises risk to personnel and with the approval of authorised person/s
	2.10	Maintenance is carried out efficiently without waste of materials, damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete mechanical signalling equipment and infrastructure maintenance	**3.1**	WHS\OHS work completion risk control measures and procedures are followed
	3.2	Approval to conduct a check of equipment operation is obtained in accordance with relevant rail operational rules and procedures
	3.3	Track clearance check is made before conducting equipment operation check to ensure safe train movement
	3.4	Authorised equipment check is carried out in accordance with workplace procedures to identify any equipment faults
	3.5	Operational effectiveness of equipment is confirmed through observation during train movements, as required
	3.6	Equipment faults are identified, recorded and corrective action is taken
	3.7	Equipment is locked and secured to prevent unauthorised access
	3.8	Work completion is documented and appropriate person/s notified in accordance with workplace procedures and relevant report/s completed

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN101A Maintain mechanical rail signalling equipment and infrastructure.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0016 Maintain mechanical rail signalling equipment and infrastructure

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- interpreting specifications correctly
- maintaining equipment in accordance with workplace procedures
- using chemicals and tools safely
- testing that equipment is fully functional after maintenance
- checking that technical/operational specifications are met and that equipment is in compliance with work orders
- applying effective fault diagnosis techniques
- ensuring safe trained movement through work area
- following relevant codes of practice, work health and safety (WHS)/occupational health and safety (OHS) and environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant standards, codes and rail safety regulations
- applying relevant WHS/OHS) requirements, including:
  - implementing workplace procedures and practices
  - using of risk control measures
- applying sustainable energy principles and practices
- completing rail mechanical signalling equipment and infrastructure maintenance
- preparing rail mechanical signalling equipment and infrastructure for maintenance.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- mechanical rail signalling equipment and infrastructure maintenance requirements and techniques, safe working practices and relevant standards, codes and regulations, including:
  - basic rail operations encompassing:

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    - rail terminology
    - train dynamics
    - essentials of safe movement of trains
    - purpose of rail signalling
- rail signalling, regulations and codes encompassing:
    - codes - philosophy and format
    - how to read and apply a code
    - codes that apply to rail signalling - relevant to a rail network
- technical manuals and catalogues encompassing:
    - typical format
    - how to read and apply information
- environmental and heritage awareness encompassing:
    - purpose of environmental and heritage regulation
    - typical issues affecting electrotechnology services and systems
    - meeting requirements
- enterprise work activities records encompassing:
    - purpose and extent of maintaining work activities records in an enterprise
    - types of records for maintaining work activities in an enterprise
    - methods for recording and maintaining work records
    - work records required by regulation requirements
- electrical safe working practices encompassing:
    - risk management and assessment of risk
    - principle and purpose of risk management
    - processes for conducting a risk assessment
    - hazards associated with low voltage (LV), extra-low voltage (ELV) and high currents
    - arrangement of power distribution and circuits in an electrical installation
    - parts of an electrical system and equipment that operate at LV and ELV
    - parts of an electrical system and equipment where high currents are likely
    - safety, selection, use, maintenance and care of test equipment
    - safety characteristics of electrical testing devices
    - safe use of electrical testing device
    - checks and storage methods for maintaining the safety of testing devices
- rail safe working practices encompassing:
    - rail enterprise safety standards and procedures
    - rail safe working requirements
    - possessions protection and management
- rail signalling, drawings and diagrams
- drawing types and applications encompassing:
    - drawing layouts and conventions

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    - drawing symbols
    - cable and equipment schedules
- rail signalling principles - mechanical encompassing:
    - overview of mechanical rail signalling
    - purpose of elements of a mechanical rail signalling system - signals, point actuating systems, locking and train detection systems, control input devices, indicators, diagrams and monitors, interlocking and safe working systems
- rail signalling - mechanical equipment encompassing:
    - equipment and their components
    - operating principles
    - servicing procedures
- rail signalling - point actuating devices encompassing:
    - equipment and their components - point machines, detectors, claw/clamp locks, swing nose mechanisms and in-bearer mechanisms
    - operating principles
    - servicing procedures
- rail signalling - interlocking systems - mechanical encompassing:
    - equipment and their components
    - operating principles and parameters
    - servicing procedures
- rail signalling - electro-pneumatic equipment encompassing:
    - equipment and their components - compressors, air lines and control valves
    - operating principles and parameters
    - servicing procedures
- safe working practices and relevant standards, codes and regulations
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy

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requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to servicing mechanical rail signalling equipment and infrastructure
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0017 Repair rail signalling power and control cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to repair of signalling power cables and multi-core signalling control cables up to 50 cores.

It includes following workplace procedures, selecting and using appropriate cable joining methods, testing continuity and insulation resistance of repaired cable cores, and reporting repair activities.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0001 Assemble and wire internal electrical rail signalling equipment

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to repair rail signalling cables	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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		for work area are identified, obtained and applied
	1.2	Hazards are identified, risks assessed, and control measures and workplace procedures implemented
	1.3	Safety hazards that have not previously been identified are noted on the job safety assessments and existing risk control measures implemented
	1.4	Access times and safe work methods are confirmed to comply with customer requirements and relevant rail safety legislation
	1.5	Appropriate person/s is consulted to ensure work is coordinated effectively with others on the worksite
	1.6	Extent and nature of the fault or damage to the rail signalling cable is confirmed with appropriate person/s in accordance with workplace procedures
	1.7	Cable joining kit is obtained in accordance with workplace procedures and components checked with manufacturer specifications
	1.8	Cable diagrams necessary to effect repairs are obtained, read and interpreted
	1.9	Tools and cable testing devices for cable repair are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Repair damaged rail signalling cables	**2.1**	Work area is made safe, damaged rail signalling cable is isolated for repair and WHS/OHS risk control measures and workplace procedures for carrying out the repair/s are followed
	2.2	Corresponding ends of broken cable core are identified by core marking and confirmed by continuity test in accordance with workplace procedures
	2.3	Cable joining kit is used to repair damaged cable following manufacturer specifications and workplace procedures
	2.4	Repair to damaged cable is tested for cable core continuity insulation between cable cores and cores to earth in accordance with workplace procedures
	2.5	Cause of failed cable test is located and rectified in

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		accordance with workplace procedures
	2.6	Existing work methods for dealing with unplanned situations are dealt with safely in a manner that minimises risk to personnel and equipment and with the approval of an authorised person/s
	2.7	Cable repair is completed without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete rail signalling cable repairs	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Work area is cleaned and made safe in accordance with workplace procedures
	3.3	Cable repair work, test results and relevant reports are documented and appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Performing signalling cable repairs must include the following:

- repairing at least one signalling power cable relevant to a particular rail transport operator
- repairing at least one signalling multi-core control cable, six cores or greater, relevant to a particular rail transport operator
- repairing signalling cables using at least one approved jointing kit

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN121A Repair rail signalling power and control cables.

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Links

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Assessment Requirements for UEERS0017 Repair rail signalling power and control cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- applying sustainable energy principles and practices
- completing rail signalling cable repairs
- completing relevant technical reports, records and documentation
- dealing with unplanned events in a manner that minimises risk to personnel and equipment
- identifying corresponding ends of broken cable cores accurately
- interpreting cable diagrams
- locating and rectifying causes of failed cable test
- preparing to repair rail signalling cables
- repairing damaged rail signalling cables effectively and in accordance with workplace procedures
- selecting approved cable joining kit, cable repair tools and testing devices
- using testing devices and tools correctly and safely.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- conductor continuity and core insulation and earth testing procedures and acceptable results, including:
  - testing to confirm de-energised cores
  - continuity of repaired cores, earth resistance of repaired cores and insulation between repaired cores
  - industry standard acceptable cable test results
  - recording of test results
- methods of joining broken cable core conductors and reinstating insulation, including:

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    - using hand tools to remove insulation and apply crimp lugs
    - selecting inline joiner lugs
    - selecting appropriate jointing materials and kits
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- special termination tools and their use, including:
    - insulation removal tools
    - inline crimping tools
    - conducting tool tests
    - checking calibration date
    - recording tests
- types of cable used for rail signalling including signalling power and multi-core control cables
- types of cable joining kits used to repair damaged signal cables, including heat shrink and waterproof jointing (epoxy mould)
- workplace procedures for identifying corresponding ends of broken cable cores, including cable isolation methods and testing de-energised cable cores.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0018 Test and commission rail power equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to test and commission rail signalling power equipment into service on rail networks.

It includes preparing, inspecting, testing and commissioning rail power signalling circuits, equipment and components. It also includes completing connection of wiring circuitry, equipment and components; testing of wiring circuitry, equipment and components; finding and repairing faults; testing of control and indicating equipment; and reporting requirements.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0007 Install and maintain non-vital screen-based rail control systems

UEERS0008 Install and maintain non-vital telemetry systems

UEERS0004 Find and repair rail signalling system faults

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential	Performance criteria describe the performance needed to

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outcomes.	demonstrate achievement of the element.
1 Prepare to inspect, test and commission power signalling circuits, equipment and components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and clarified
	1.2 Hazards are identified, WHS/OHS risks assessed, and control measures and workplace procedures implemented in preparation for work
	1.3 Scope of inspection, testing and commissioning is determined from job specifications, design drawings and regulatory requirements
	1.4 Appropriate safe working person/s is consulted to ensure work activity is coordinated effectively with others involved on the worksite
	1.5 Materials needed for testing and commissioning of power signalling circuits, equipment and components are obtained in accordance with workplace procedures and checked against job specifications
	1.6 Tools, equipment and testing devices needed to inspect, test and commission power signalling circuits, equipment and components are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Inspect, test and commission power signalling circuits, equipment and components	**2.1** WHS/OHS risk control measures and procedures for carrying out work are followed
	2.2 On-track safe working requirements are identified and applied in accordance with workplace procedures and safety management system
	2.3 Inspection is carried out and circuits, equipment and components are checked to ensure they are in accordance with manufacturer and system specifications
	2.4 Inspecting, testing and commissioning work includes installation, termination and operation of the signalling equipment; and checking indicators and signal system operation is completed in accordance with network

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		requirements and relevant industry standards
	2.5	Methods for dealing with unplanned situations are selected on the basis of safety and specified work outcomes
	2.6	Inspection, testing, commissioning and repairs are performed efficiently, without waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
	2.7	System and design faults are verified using relevant industry technical standards information, fault-finding and diagnostic techniques to identify faulty wiring equipment and components
	2.8	Identified irregularities and non-conforming wiring, equipment or components are documented and immediate follow-up action is initiated to ensure faults are rectified
	2.9	Faulty signalling equipment is replaced, adjusted and secured in accordance with manufacturer specifications and workplace procedures
3 Complete testing and commissioning work and reports	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Inspection and test results are documented in accordance with workplace procedures and faulty or replaced equipment is tagged and despatched to maintain equipment spares
	3.3	Operational equipment is handed over to approved person/s in accordance with handover workplace procedures and final documentation is completed

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN128A Test and commission rail power equipment.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0018 Test and commission rail power equipment

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- reading and interpreting specifications correctly
- testing and commissioning signalling circuits, equipment and components to meet operational and technical standards
- using effective fault diagnosis and repair/replacement techniques to specified model level
- confirming circuits, equipment and components operated within specified technical parameters
- testing equipment and instruments
- using tools correctly
- following relevant codes of practice, environmental protection procedures and requirements
- completing relevant technical reports, records and documentation
- dealing with unplanned events
- applying rail safe working practices and relevant industry standards, codes and rail safety regulations
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
  - implementing workplace procedures and practices
  - using risk control measures
- applying sustainable energy principles and practices.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- power signalling testing and commissioning, safe working practices and relevant standards, codes and regulations, including power signalling system design, encompassing:
  - characteristics
  - diagrams

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    - specifications
  - power signalling components encompassing:
    - types
    - testing
    - adjustments
  - power signalling system commissioning encompassing:
    - requirements
    - hazards
    - procedures
    - records and reporting
- rail safe working and safety management systems
- relevant industry standards, codes of practice, regulations and WHS/OHS legislated requirements
- relevant workplace documentation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to testing and commissioning power signalling equipment
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEERS0019 Test copper rail signalling cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to test signal and communication copper cables.

It includes following workplace procedures, determining tools required, setting up and conducting tests, interpreting test results, determining activities to maintain system integrity and reporting activities.

Persons achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rules and/or guidelines.

No other licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERS0017 Repair rail signalling power and control cables

Competency Field

Rail Signalling

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to inspect and test rail signalling cable	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures

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		for work area are identified, obtained and applied
	1.2	Hazards are identified, risks assessed, and control measures and workplace procedures implemented
	1.3	Safety hazards that have not previously been identified are noted on the job safety assessments and existing risk control measures implemented
	1.4	Access times and work methods are confirmed to comply with customer requirements and relevant rail safety legislation
	1.5	Rail service access is checked prior to testing and signalling cable is isolated/disconnected from rail network/equipment to ensure no equipment damage can occur during testing
	1.6	Required inspection, test procedures and purpose are identified from site, client, workplace documentation and manufacturer specifications
	1.7	Tools and testing devices needed for cable testing are obtained in accordance with workplace procedures and checked for correct operation and safety
	1.8	Testing devices calibration certification is checked and current in accordance with manufacturer specifications
2 Inspect and test rail signal cables	**2.1**	Work area and rail cable system is made safe for testing in accordance with WHS/OHS risk control measures and workplace procedures
	2.2	Rail signal cables are inspected in accordance with workplace procedures and relevant specifications
	2.3	Tests are set up and performed in accordance with safety risk control measures and manufacturer specifications
	2.4	Test results are read accurately and compared against manufacturer and site specifications for rail cable performance
	2.5	Existing methods for dealing with unplanned situations are dealt with safely in a manner that minimises risk to personnel and equipment and with the approval of an authorised person/s
	2.6	Testing is performed efficiently without waste of materials or damage to apparatus, the surrounding

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		environment or services in accordance with sustainable energy practices
	2.7	Available services are connected and tested for functionality to ensure all previous services have been resumed
3 Report test results	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed
	3.2	Recommendations and required actions to maintain cable system integrity resulting from cable tests are reported and documented
	3.3	Results of tests are documented accurately and in a timely manner to ensure test results remain current
	3.4	Site and installation records are updated to ensure traceability of system information performance is maintained in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Identifying and testing of copper rail signalling cables must include the following:

- five non-compliant test results

Unit Mapping Information

This unit replaces and is equivalent to UEENEEN104A Test copper rail signalling cables.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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Assessment Requirements for UEERS0019 Test copper rail signalling cables

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- applying sustainable energy principles and practices
- performing copper rail signalling cable tests, including:
  - checking that technical/operational specifications are met and that cables comply with specifications
  - completing relevant technical reports, records and documentation
  - confirming the integrity of a cable system
  - dealing with unplanned events
  - following relevant codes of practice, procedures and requirements
  - interpreting plans and specifications correctly
  - testing cable in accordance with workplace procedures
  - using test equipment and tools correctly and safely
- preparing to test rail signalling cable
- reporting test results
- testing rail signal cables.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- performance parameters associated with copper cables and coaxial cables, including:
  - attenuation
  - attenuation to cross talk ratio (ACR)
  - characteristic impedance
  - insulation resistance (leakage)

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    - loop resistance
    - near end cross talk (NEXT)
    - noise (impulse noise and average noise)
    - open circuit, short circuit and pair continuity
    - return loss
    - split pair and crossed pair
- rail signalling cable testing techniques
- relevant industry standards and requirements relating to results for compliance for structured copper and coaxial cables, including:
    - operation of test equipment for correct evaluation of specific cable performance parameters and to obtain accurate and reliable results
    - test equipment and leads needed to evaluate a given performance parameter
    - tests required to evaluate a given performance parameter
    - transmission performance requirements
    - typical/common causes of non-compliant test results
- relevant manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation, including:
    - methods for recording and maintaining work records
    - purpose, and extent for maintaining work activities records
    - records required by regulation/regulator
    - types of records for maintaining work activities
- relevant workplace policies and procedures
- structured cabling, including:
    - higher performance cabling
    - shielded twisted pair (STP)
    - twisted pair cabling
    - unshielded twisted pair (UTP)
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable workplace operational situations that replicate workplace conditions.

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Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to testing copper rail signalling cables
- applicable documentation, including policy and workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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BSBCUS201 Deliver a service to customers

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to deliver all aspects of customer service at an introductory level. It includes creating a relationship with customers, identifying their needs, delivering services or products and processing customer feedback.

It applies to individuals who perform a range of routine tasks in the workplace using a limited range of practical skills and fundamental knowledge of customer service in a defined context under direct supervision or with limited individual responsibility.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Stakeholder Relations – Customer Service

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Establish contact with customers	1.1 Acknowledge and greet customer in a professional, courteous and concise manner according to organisational and legislative requirements 1.2 Maintain personal dress and presentation in line with organisational requirements 1.3 Communicate using appropriate interpersonal skills to facilitate accurate and relevant exchange of information

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Maintain sensitivity to customer specific needs and any cultural, family and individual differences 1.5 Establish rapport/relationship with customer and express a genuine interest in customer needs/requirements
2 Identify customer needs	2.1 Use appropriate questioning and active listening to determine customer needs 2.2 Assess customer needs for urgency to identify priorities for service delivery 2.3 Provide customer with information about available options for meeting customer needs and assist customer to identify preferred option/s 2.4 Identify personal limitations in addressing customer needs and seek assistance from designated persons where required
3 Deliver service to customers	3.1 Provide prompt customer service to meet identified needs according to organisational requirements 3.2 Provide information regarding problems and delays, and follow-up within appropriate timeframes as necessary 3.3 Communicate with customers in a clear, concise and courteous manner 3.4 Identify opportunities to enhance the quality of service and products, and take action to improve the service whenever possible
4 Process customer feedback	4.1 Promptly recognise customer feedback and handle sensitively according to organisational and legislative requirements 4.2 Accurately record any feedback and communication between customers and the organisation according to organisational standards, policies and procedures and legislative requirements 4.3 Identify any unmet customer needs and discuss suitability of other products/services 4.4 Support customers to make contact with other services according to organisational policies and procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

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Skill	Performance Criteria	Description
Reading	1.1, 1.2, 3.1, 4.1, 4.2, 4.4	• Understands requirements in organisational policy and procedure documents • Interprets product and service information in a range of formats to provide customer advice
Writing	4.2	• Records customer information according to organisational requirements
Oral Communication	1.1, 1.3, 1.4, 1.5, 2.1-2.4, 3.2, 3.3, 4.3	• Provides information or advice using structure and language to suit the audience • Asks questions and listens to gain information or confirm understanding
Navigate the world of work	1.1, 1.2, 3.1, 4.1, 4.2, 4.4	• Follows organisational procedures and practices relevant to own role
Interact with others	1.1, 1.3-1.5, 2.1-2.4, 3.1, 3.2, 3.3, 4.1, 4.3, 4.4	• Uses accepted communication practices to establish connections, build rapport and develop professional working relationships • Adjusts personal communication style in response to the opinions, values and particular needs of others
Get the work done	3.2, 3.4, 4.1- 4.3	• Addresses routine problems in familiar work contexts • Recognises opportunities to enhance work practices and outcomes

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
BSBCUS201 Deliver a service to customers	BSBCUS201B Deliver a service to customers	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBCUS201 Deliver a service to customers

Modification History

Release	Comments
Release 1	This version first released with Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- greet customer and establish rapport/relationship in accordance with organisational requirements
- identify customer needs using appropriate interpersonal skills
- provide prompt service to address customer needs in accordance with organisational requirements
- identify and follow up opportunities to increase the quality of service and products
- respond to and record all customer feedback according to organisational standards, policies and procedures.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- identify and briefly describe key provisions of relevant legislation from all forms of government that apply to provision of customer services
- identify and explain workplace organisational policies and procedures relating to customer service and the customer service process.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the customer service field of work and include access to:

- office equipment and technology
- workplace documents, organisational policies and procedures for customer service

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- examples of customer complaints and feedback
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBCUS401 Coordinate implementation of customer service strategies

Modification History

Release	Comments
Release 2	This version released with BSB Business Services Training Package Version 2.0 Version created to clarify assessment conditions
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to advise, carry out and evaluate customer service strategies.

It applies to individuals who have well developed skills and a broad knowledge of customer service strategies for addressing customer needs and problems, and who may provide guidance or delegate work related tasks to others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Stakeholder Relations – Customer Service

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Advise on customer service needs	1.1 Clarify and accurately assess customer needs using appropriate communication techniques

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ELEMENT	PERFORMANCE CRITERIA
	1.2 Diagnose problems matching service delivery to customers and develop options for improved service within organisational requirements 1.3 Provide relevant and constructive advice to promote the improvement of customer service delivery 1.4 Use business technology and/or online services to structure and present information on customer service needs
2 Support implementation of customer service strategies	2.1 Ensure customer service strategies and opportunities are promoted to designated individuals and groups 2.2 Identify and allocate available budget resources to fulfil customer service objectives 2.3 Promptly action procedures to resolve customer difficulties and complaints within organisational requirements 2.4 Ensure that decisions to implement strategies are taken in consultation with designated individuals and groups
3 Evaluate and report on customer service	3.1 Review client satisfaction with service delivery using verifiable data in accordance with organisational requirements 3.2 Identify and report changes necessary to maintain service standards to designated individuals and groups 3.3 Prepare conclusions and recommendations from verifiable evidence and provide constructive advice on future directions of client service strategies 3.4 Maintain systems, records and reporting procedures to compare changes in customer satisfaction

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.2, 1.4, 2.3, 3.1	• Reviews textual information and comprehends details that relate to the interests or requirements of the client and organisation
Writing	1.4, 3.3, 3.4	• Creates a range of formal texts using structure, grammar and clear and specialised language to

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		describe customer needs, maintain information and support a particular position
Oral Communication	1.1, 1.3, 2.1, 2.4, 3.2	• Uses pace, intonation, intelligible pronunciation and listening and questioning techniques to interact effectively with others
Numeracy	2.2	• Recognises and interprets numerical information and performs calculations on familiar mathematical information
Navigate the world of work	1.2, 2.3, 3.1, 3.2	• Recognises and applies organisational protocols and meets expectations associated with own work
Interact with others	1.1, 1.3, 2.1, 2.4, 3.2, 3.3	• Selects the appropriate form, channel and mode of communication for a specific purpose relevant to own role • Uses a range of strategies to establish a sense of connection and build rapport with customers • Collaborates with others contributing knowledge and skills to achieve joint outcomes
Get the work done	1.2, 1.4, 2.3, 3.1- 3.4	• Applies formal and logical processes when planning and implementing tasks • Applies standard procedures when responding to familiar problems within own work context • Uses digital technologies to access, organise, present and store information relevant to own role

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBCUS401 Coordinate implementation of customer service strategies Release 2	BSBCUS401 Coordinate implementation of customer service strategies Release 1	Updated to clarify assessment conditions	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBCUS401 Coordinate implementation of customer service strategies

Modification History

Release	Comments
Release 2	This version released with BSB Business Services Training Package Version 2.0. Version created to clarify assessment conditions
Release 1	This version first released with Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- identify the needs and priorities of the organisation in delivering services to customers
- diagnose problems in delivery of customer service
- respond to and report on customer feedback and complaints
- review client satisfaction using verifiable data
- consult and communicate effectively with relevant people
- develop and implement strategies and methods to improve customer service delivery including:
  - budgeting
  - promotion to staff
  - documentation and follow up.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline the principles of customer service
- explain sources of information and techniques for identifying customer needs and reviewing customer satisfaction
- explain the organisational business structure, products and services related to customer service
- describe product and service standards and best practice models.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the customer service field of work and include access to:

- office equipment
- business technology
- organisational policies and procedures for customer service
- examples of customer complaints and feedback
- client satisfaction data
- case studies and, where possible, real situations
- interaction with others.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBINM401 Implement workplace information system

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to implement and review the workplace information system. It involves the identification, acquisition, initial analysis and use of appropriate information which plays a significant part in the organisation's effectiveness.

It applies to individuals whose work will normally be carried out within routine and non-routine methods and procedures which require planning and evaluation, leadership and guidance of others, and some discretion and judgement.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Knowledge Management – Information Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Identify and source information needs	1.1 Determine and locate information required by teams 1.2 Acquire and review information held by the organisation to determine suitability, accessibility, currency and reliability according to organisational policies
2 Collect, analyse and report information	2.1 Collect information, which is adequate and relevant to the needs of teams, in a timely manner

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ELEMENT	PERFORMANCE CRITERIA
	2.2 Ensure information is in a format suitable for analysis, interpretation and dissemination 2.3 Analyse information to identify and report relevant trends and developments in terms of the needs for which it was acquired
3 Implement information systems	3.1 Implement management information systems effectively to store, retrieve and regularly review data for decision making purposes 3.2 Use technology available in the work area to manage information effectively 3.3 Submit recommendations for improving the information system to designated persons and/or groups
4 Prepare for information system changes	4.1 Collect information about information system future needs in consultation with colleagues, including those who have a specialist role in resource management 4.2 Ensure estimates of information system future needs reflect the organisation's business plans, and customer and supplier requirements 4.3 Support proposals to secure resources by clearly presenting submissions that describe realistic options, benefits, costs and outcomes 4.4 Prepare team members to work with new technology and information system changes

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 4.1, 4.2, 4.3, 4.4	• Critically analyses complex documentation from a variety of sources and consolidates information relating to specific criteria to determine requirements
Writing	1.2, 2.1, 2.3, 3.1, 3.3, 4.1, 4.2, 4.3, 4.4	• Develops material for a specific audience using clear and detailed language in order to convey explicit information, requirements and recommendations
Oral	1.1, 3.3, 4.1, 4.3, 4.4	• Uses active listening and questioning and reading of verbal and non-verbal signals to convey and clarify

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Communication		information and to confirm understanding
Numeracy	4.1-4.3	• Selects from and uses a variety of developing mathematical and problem solving strategies to ensure estimates of information reflect the business plan and staff requirements
Navigate the world of work	1.2	• Takes responsibility for following policies, procedures and legislative requirements and identifies organisational implications of new legislation or regulation
Interact with others	1.1, 3.3, 4.1, 4.3, 4.4	• Selects and uses appropriate conventions and protocols when communicating with clients and co-workers in a range of work contexts • Cooperates with others and contributes to work practices where joint outcomes are expected and deadlines are to be met
Get the work done	1.1, 1.2, 2.1, 2.3, 3.1, 3.2, 4.1, 4.2	• Takes responsibility for planning, sequencing and prioritising tasks and own workload for efficiency and effective outcomes • Contributes to continuous improvement of current work practices by applying basic principles of analytical thinking • Uses familiar digital technologies and systems to access, enter, present and communicate data and information

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBINM401 Implement workplace information system	BSBINM401A Implement workplace information system	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBINM401 Implement workplace information system

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- identify, source and analyse information to determine
  - information system needs
  - whether it is fit for purpose
  - trends and developments
- implement and review the workplace information system
- review a workplace information system and prepare and present a submission recommending improvements.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- identify the information systems that are, or should be, available in the workplace
- explain the information management systems and technology typically associated with the workplace including:
  - budgets and financial management systems
  - customer information software or records
  - databases
  - personal digital assistant (PDA)
  - product and service information
  - project management software
  - record management systems
  - spreadsheets.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the knowledge management – information management field of work and include access to:

- business technology
- a workplace information system
- workplace policies and procedures.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBINM501 Manage an information or knowledge management system

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to organise training for others for an information or knowledge management system and to manage the use of the system.

It applies to individuals who are responsible for seeing that key information and corporate knowledge are retained, accessible to others and improve business outcomes.

The unit applies to information or knowledge management systems which comprise policies, protocols, procedures and practices to manage information or knowledge within the organisation and among relevant stakeholders.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Knowledge Management – Information Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Organise learning to use information or knowledge management system	1.1 Identify learning needs of relevant personnel and stakeholders for input into and use of an information or knowledge management system 1.2 Identify and secure human, financial and physical resources

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ELEMENT	PERFORMANCE CRITERIA
	required for learning activities to use an information or knowledge management system 1.3 Organise and facilitate learning activities 1.4 Promote and support use of the system throughout the organisation 1.5 Monitor and document effectiveness of learning activities
2 Manage use of information or knowledge management system	2.1 Ensure implementation of policies and procedures for the information or knowledge management system are monitored for compliance, effectiveness and efficiency 2.2 Address implementation issues and problems as they arise 2.3 Monitor integration and alignment with data and information systems 2.4 Collect information on achievement of performance measures 2.5 Manage contingencies such as system failure or technical difficulties by accessing technical specialist help as required
3 Review use of information or knowledge management system	3.1 Analyse effectiveness of system and report on strengths and limitations of the system 3.2 Review business and operational plan and determine how effectively the system is contributing to intended outcomes 3.3 Make recommendations for improvement to system, policy or work practices

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1-1.5, 2.1-2.5, 3.1-3.3	• Researches and critically analyses documentation from a variety of sources to determine requirements
Writing	1.1-1.5, 2.1-2.4, 3.2, 3.3	• Prepares and produces documentation for a specific audience using clear and detailed language to convey explicit information, requirements and recommendations

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Oral Communication	1.1, 1.2, 1.3, 1.4, 2.2, 2.5, 3.3	• Presents information using structure and language to suit the audience • Uses active listening and questioning and reading of verbal and non-verbal signals to clarify information and to confirm understanding
Navigate the world of work	2.1, 3.3	• Takes full responsibility for following policies, procedures and legislative requirements and identifies organisational implications of new legislation or regulation • Modifies or develops organisational policies and procedures to comply with legislative requirements and organisation goals
Interact with others	1.1-1.4, 2.5, 3.3	• Implements strategies for a diverse range of colleagues and clients in order to build rapport and foster strong relationships • Collaborates with others sharing information to build strong work groups and avoid behaviours that are not conducive to a productive environment • Elicits feedback and provides feedback to others in order to improve self or workgroup behaviours
Get the work done	1.1-1.5, 2.1-2.5, 3.1, 3.2	• Accepts responsibility for planning and sequencing complex tasks and workload, negotiating key aspects with others and taking into account capabilities, efficiencies and effectiveness • Monitors progress of plans and schedules and reviews and changes them to meet new demands and priorities • Applies systematic and analytical processes to address problems and make decisions in complex situations • Investigates new and innovative ideas as a means to continuously improve, work practices and processes • Uses and investigates new digital technologies and applications to manage and manipulate data and communicate effectively with others

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBINM501 Manage an information or knowledge	BSBINM501A Manage an information or knowledge	Updated to meet Standards for Training Packages	Equivalent unit

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Code and title current version	Code and title previous version	Comments	Equivalence status
management system	management system		

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBINM501 Manage an information or knowledge management system

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- identify learning needs and plan and implement learning activities to enable personnel to use information or knowledge management system including
  - providing human, financial and physical resources as required
  - use of coaching, mentoring, information sessions, workshops, training programs and e-learning as appropriate
- monitor performance and address issues and contingencies as they arise including
  - accessing technical specialists as required
  - correct application of policies and procedures for the information or knowledge management system
  - alignment and effectiveness of the policies and procedures
  - effectiveness of information or knowledge management system for intended outcomes
- recommend improvements to systems, policies and practices as appropriate.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline relevant legislation, codes of practice and national standards relevant to privacy, freedom of information and knowledge management
- explain organisational policies and procedures including:
  - records management
  - information management
  - customer service
  - commercial confidentiality

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- describe the organisational operations and existing data and information systems.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the knowledge management – information management field of work and include access to:

- relevant legislation, regulation, standards and codes
- relevant workplace systems, documentation and resources
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBINN301 Promote innovation in a team environment

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to be an effective and proactive member of an innovative team.

It applies to individuals who play a proactive role in demonstrating, encouraging or supporting innovation in a team environment. The individual may be a team participant or a team leader. Teams may be formal or informal and may comprise a range of personnel.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Creativity and Innovation – Innovation

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Create opportunities to maximise innovation within the team	1.1 Evaluate and reflect on what the team needs and wants to achieve 1.2 Check out information about current or potential team members' work in the context of developing a more innovative team 1.3 Bring people into the team or make suggestions for team members based on what needs to be achieved and the potential for cross fertilising ideas

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Acknowledge, respect and discuss the different ways that people may contribute to building or enhancing the team
2 Organise and agree effective ways of working	2.1 Jointly establish ground rules for how the team will operate 2.2 Agree and communicate responsibilities in ways that encourage and reinforce team-based innovation 2.3 Agree and share tasks and activities to ensure the best use of skills and abilities within the team 2.4 Plan and schedule activities to allow time for thinking, challenging and collaboration 2.5 Establish personal reward and stimulation as an integral part of the team's way of working
3 Support and guide colleagues	3.1 Model behaviour that supports innovation 3.2 Seek external stimuli and ideas to feed into team activities 3.3 Proactively share information, knowledge and experiences with other team members 3.4 Challenge and test ideas within the team in a positive and collaborative way 3.5 Proactively discuss and explore ideas with other team members on an ongoing basis
4 Reflect on how the team is working	4.1 Debrief and reflect on activities and on opportunities for improvement and innovation 4.2 Gather and use feedback from within and outside the team to generate discussion and debate 4.3 Discuss the challenges of being innovative in a constructive and open way 4.4 Take ideas for improvement, build them into future activities and communicate key issues to relevant colleagues 4.5 Identify, promote and celebrate successes and examples of successful innovation

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

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Skill	Performance Criteria	Description
Reading	1.2, 4.2	• Interprets and analyses textual information, from a wide range of sources, to identify information relevant to team activities
Writing	2.2, 3.3, 4.4	• Uses clear language and formats appropriate for the audience to highlight and present specific information
Oral Communication	1.2, 1.3, 1.4, 2.1, 2.2, 3.5, 4.1, 4.2, 4.3, 4.4, 4.5	• Actively participates in verbal exchanges of ideas and elicits the views and opinions of team members by listening and questioning • Uses clear language to clarify rules and roles relating to team activities in formal and informal situations
Numeracy	1.2, 4.2	• Interprets numeric information relevant to team activities
Navigate the world of work	1.1, 3.1, 3.2, 3.5	• Understands the nature and purpose of own role and how it affects others in the work context
Interact with others	1.1-1.4, 2.1, 2.2, 3.1, 3.2, 3.4, 3.5, 4.1, 4.2, 4.4, 4.5	• Uses inclusive techniques to initiate, contribute and promote discussion amongst potentially diverse team members • Recognises the importance of establishing and building effective working relationships • Selects the appropriate form, channel and mode of communication for a specific purpose relevant to own role
Get the work done	1.3, 1.4, 2.2, 2.4, 2.5, 3.2, 3.4, 4.2, 4.4, 4.5	• Plans, sequences and prioritises tasks for efficient and effective outcomes • Contributes to continuous improvement of current work practices by applying basic principles of analytical and lateral thinking • Uses problem-solving processes to address less predictable problems, and when appropriate, seeking input from others • Reflects on outcomes and further explores own and the team's role in implementing innovation

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status

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Code and title current version	Code and title previous version	Comments	Equivalence status
BSBINN301 Promote innovation in a team environment	BSBINN301A Promote innovation in a team environment	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBINN301 Promote innovation in a team environment

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- apply practices that promote innovation within a team including:
  - modelling open and respectful communications
  - contributing to the make-up and rules of the team
  - planning and scheduling of activities
  - reflecting on activities, feedback and challenges to identity improvement options
- encourage others to contribute to innovation in the team
- implement improvements and communicate about them.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain what innovation is, the different types of innovation and the benefits of innovation
- describe the internal and external factors that contribute to a team becoming and remaining innovative including:
  - team characteristics
  - the role of group dynamics and diversity
  - broader environmental factors
- explain how activities can encourage or hinder innovation in a team including:
  - allocation of time and activities
  - modelling behaviour
  - rewards and recognition
  - communications

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- feedback.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the creativity and innovation and include access to:

- workplace documents
- case studies and, where possible, real situations
- office equipment and resources
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBINN502 Build and sustain an innovative work environment

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to create an environment that enables and supports the application of innovative practice focusing on a holistic approach to the integration of innovation across all areas of work practice.

It applies to individuals working in leadership or management roles in any industry or community context. The individual could be employed by the organisation, but may also be an external contractor, the leader of a cross organisation team or of a self-formed team of individuals. The work group could be permanent or temporary in nature.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Creativity and Innovation – Innovation

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Lead innovation by example	1.1 Make innovation an integral part of leadership and management activities 1.2 Demonstrate positive reception of ideas from others and provide constructive advice 1.3 Establish and maintain relationships based on mutual respect and trust

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Take considered risks to open up opportunities for innovation 1.5 Regularly evaluate own approaches for consistency with the wider organisational or project context
2 Establish work practices that support innovation	2.1 Consult on and establish working conditions that reflect and encourage innovative practice 2.2 Introduce and maintain workplace procedures that foster innovation and allow for rigorous evaluation of innovative ideas 2.3 Facilitate and participate in collaborative work arrangements to foster innovation 2.4 Build and lead teams to work in ways that maximise opportunities for innovation
3 Promote innovation	3.1 Acknowledge suggestions, improvements and innovations from all colleagues 3.2 Find appropriate ways of celebrating and promoting innovation 3.3 Promote and reinforce the value of innovation according to the vision and objectives of the organisation or project 3.4 Promote and support the evaluation of innovative ideas within the wider organisational or project context
4 Create a physical environment which supports innovation	4.1 Evaluate the impact of the physical environment in relation to innovation 4.2 Collaborate with colleagues about ideas for enhancing the physical work environment before taking action 4.3 Consider potential for supporting innovation when selecting physical resources and equipment 4.4 Design, fit-out and decorate workspaces to encourage creative mindsets, collaborative working and the development of positive workplace relationships
5 Provide learning opportunities	5.1 Pro-actively share relevant information, knowledge and skills with colleagues 5.2 Provide or encourage formal and informal learning opportunities to help develop the skills needed for innovation 5.3 Create opportunities in which individuals can learn from the experience of others

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Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.5, 2.2, 4.1, 5.1	• Interprets and evaluates information that may deal with complex ideas related to issues both within and outside a given workplace context
Writing	3.3, 3.4, 5.1	• Develops information for others using language to suit the context and audience
Oral Communication	1.2, 2.1, 2.3, 3.1, 3.3, 3.4, 5.1	• Presents ideas and concepts to a range of audiences using structure and language to suit the audience • Uses active listening and questioning to discuss and clarify information and to confirm understanding
Navigate the world of work	1.1, 1.5, 2.1, 2.2, 3.3, 5.1, 5.2	• Takes responsibility for implementing practices and procedures to achieve organisational objectives in innovation according to role requirements • Stays up to date with professional development options to provide relevant information to staff
Interact with others	1.2, 1.3, 2.3, 2.4, 3.1-3.4, 4.2, 5.1, 5.3	• Uses appropriate communication techniques to build rapport and foster strong relationships with co-workers in a range of work contexts • Uses inclusive and collaborative techniques to share, promote and convey complex information about new ideas and systems within the workplace
Get the work done	1.1, 1.4, 1.5, 2.1, 3.2, 3.3, 4.1, 4.3, 4.4, 5.2, 5.3	• Accepts responsibility for planning and implementing tasks and practices to achieve organisational goals, negotiating key aspects with others and taking into account current capabilities and needs • Develops new and innovative ideas through exploration, evaluation, analysis and critical thinking • Facilitates a climate where people feel comfortable suggesting and discussing improvements or new ideas • Uses problem solving processes to identify, assess and respond to challenges and risks around innovation

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status

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Code and title current version	Code and title previous version	Comments	Equivalence status
BSBINN502 Build and sustain an innovative work environment	BSBINN502A Build and sustain an innovative work environment	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBINN502 Build and sustain an innovative work environment

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to maximise opportunities for innovation by:

- establishing procedures and practices that foster innovation including:
  - collaborative work arrangements
  - building team capacity to contribute to innovation
  - providing formal and informal learning opportunities
  - evaluating ideas
  - celebration and promotion of innovation
  - consultation
  - respectful communications and sharing of ideas and feedback
- reinforcing the value of innovation to the vision and objectives of the organisation,
- model ling behaviour including being receptive to ideas, giving constructive advice, evaluating own work, establishing and maintaining relationships based on mutual respect and trust, taking considered risks that provide opportunities for innovation
- evaluating how the physical environment can be enhanced to support innovation and collaboration and collaborating on ideas to make improvements including in the selection of physical resources and equipment, and the design, fit-out and decoration of the workspaces
- making changes to a workspace that will encourage innovation in at least one of
  - design
  - fit-out
  - decoration.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

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Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain the concepts and theories of innovation and how these link to innovation in practice
- explain the context for innovation in the workplace including core business values, overall objectives, broader environmental context and the need to ensure the value and benefit of innovative ideas and projects
- discuss the factors and tools that can motivate individuals to use creative thinking and apply innovative work practices
- research the legislative framework that impacts on operations in the relevant workplace context
- explain how different approaches to management and leadership can support or hinder innovation
- discuss typical challenges and barriers to innovation within teams and organisations and ways of overcoming these including rewarding and celebrating innovation, coaching and learning, modelling behaviour and managing the physical environment.
-

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the creativity and innovation and include access to:

- workplace documents
- case studies and, where possible, real situations
- office equipment and resources
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBINS501 Implement information and knowledge management systems

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to organise training for an information and knowledge management system and to implement the use of the system.

The unit applies to individuals who are responsible for ensuring relevant information and corporate knowledge are retained, accessible and improve business outcomes.

It applies to information and knowledge management systems that comprise policies, protocols, procedures and practices to manage information or knowledge within the organisation and among relevant stakeholders.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Technical Skills – Information Services

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Implement use of management system	1.1 Identify legislative requirements, and organisational policies and procedures 1.2 Implement information and knowledge management system according to legislative requirements and organisational policies and procedures 1.3 Address implementation issues and problems, where required 1.4 Collect information on relevant key performance indicators 1.5 Identify contingencies and refer technical specialist help, where

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ELEMENT	PERFORMANCE CRITERIA
	required
2. Organise learning to use management systems	2.1 Identify learning requirements of relevant stakeholders for use of an information and knowledge management system 2.2 Identify and secure resources required for learning activities to use an information and knowledge management system 2.3 Organise and facilitate learning activities 2.4 Promote and support use of the system throughout the organisation 2.5 Monitor and document effectiveness of learning activities
3. Review use of management system	3.1 Analyse effectiveness of system and report on strengths and limitations of the system 3.2 Recommend improvements to information and knowledge management system, where required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Writing	• Prepares and produces documentation for a specific audience using clear and detailed language to convey explicit information, requirements and recommendations
Oral Communication	• Presents information using structure and language to suit the audience • Uses active listening and questioning and reading of verbal and non-verbal signals to clarify information and to confirm understanding
Self-management	• Takes responsibility for following policies, procedures and legislative requirements and identifies organisational implications of new legislation or regulation
Teamwork	• Collaborates with others, sharing information to build strong work groups and avoid behaviours that are not conducive to a productive environment • Elicits feedback and provides feedback to others in order to improve self or workgroup behaviours
Planning and organising	• Accepts responsibility for planning and sequencing complex tasks and workload, negotiating key aspects with others and taking into account capabilities, efficiencies and effectiveness • Monitors progress of plans and schedules and reviews and changes them to meet new demands and priorities

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Skill	Description
Problem solving	• Applies systematic and analytical processes to address problems and make decisions in complex situations
Innovation and enterprise	• Investigates new and innovative ideas to continuously improve, work practices and processes
Technology	• Uses and investigates new digital technologies and applications to manage and manipulate data and communicate effectively with others

Unit Mapping Information

Supersedes and is equivalent to BSBINM501 Manage an information or knowledge management system.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBINS501 Implement information and knowledge management systems

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- implement and review one information management system
- implement and review one knowledge management system
- facilitate learning on both these information and knowledge management systems.

In the course of the above, the candidate must:

- identify learning needs and plan and implement learning activities to enable personnel to use information and knowledge management system
- monitor performance and address issues and contingencies as they arise including:
  - accessing technical specialists, as required
  - applying correct policies and procedures for the information or knowledge management system
  - evaluating effectiveness of information or knowledge management system for intended outcomes
- recommend improvements to systems, policies and practices, where required.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- relevant legislation, regulation, standards and codes
- organisational policies and procedures, including those related to:
  - information management
  - knowledge management
- organisational operations and existing data and information systems
- relevant learning activities and key performance indicators.

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Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation, regulation, standards and codes relevant to information and knowledge management
- workplace systems, documentation and resources relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBLDR402 Lead effective workplace relationships

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit defines skills, knowledge and outcomes required to use leadership to promote team cohesion. It includes motivating, mentoring, coaching and developing the team and forming the bridge between the management of the organisation and team members.

This unit applies to team leaders, supervisors and new or emerging managers where leadership plays a role in developing and maintaining effective workplace relationships. It applies in any industry or community context.

At this level work will normally be carried out within routine and non-routine methods and procedures, which require planning and evaluation and leadership and guidance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and Leadership - Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Collect, analyse and communicate information and ideas	1.1 Collect relevant information from appropriate sources and analyse and share with the work team to improve work performance 1.2 Communicate ideas and information in a manner which is appropriate and sensitive to the cultural and social diversity of the

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ELEMENT	PERFORMANCE CRITERIA
	audience and any specific needs 1.3 Lead consultation processes to encourage employees to contribute to issues related to their work, and promptly relay feedback to the work team in regard to outcomes 1.4 Seek and value contributions from internal and external sources in developing and refining new ideas and approaches 1.5 Implement processes to ensure that issues raised are resolved promptly or referred to relevant personnel as required
2. Develop trust and confidence as leader	2.1 Treat all internal and external contacts with integrity, respect and empathy 2.2 Use the organisation's social, ethical and business standards to develop and maintain effective relationships 2.3 Gain and maintain the trust and confidence of colleagues, customers and suppliers through competent performance 2.4 Adjust interpersonal styles and methods to meet organisation's social and cultural environment 2.5 Lead and encourage other members of the work team to follow examples set according to organisation's policies and procedures
3. Develop and maintain networks and relationships	3.1 Use networks to identify and build relationships 3.2 Use networks and other work relationships to provide identifiable benefits for the team and organisation
4. Manage difficulties into positive outcomes	4.1 Identify and analyse difficulties and take action to rectify the situation within the requirements of the organisation and relevant legislation 4.2 Guide and support colleagues to resolve work difficulties 4.3 Regularly review and improve workplace outcomes in consultation with relevant personnel 4.4 Manage poor work performance within the organisation's processes 4.5 Manage conflict constructively within the organisation's processes

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

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Skill	Performance Criteria	Description
Reading	1.1	• Collects, analyses and evaluates textual information from a range of resources to inform improvement strategies
Oral Communication	1.2, 1.3, 2.4, 2.5, 4.2	• Selects or adjusts communication style to maintain effectiveness of interaction and build and maintain engagement consistent with organisational requirements
Navigate the world of work	2.2, 2.5, 4.1, 4.4, 4.5	• Recognises and follows legislative and organisational requirements relevant to own role
Interact with others	1.1-1.4, 2.1, 2.3, 2.5, 3.1, 3.2, 4.2, 4.5	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Adapts personal communication style to build trust and positive working relationships and to show respect for the opinions, values and particular needs of others • Plays a lead role in situations requiring effective collaboration, demonstrating conflict resolution skills and ability to engage and motivate others
Get the work done	1.1, 1.5, 4.1, 4.3	• Plans and implements activities and processes to manage and review work performance • Systematically gathers and analyses all relevant information to formulate and evaluate possible solutions to difficulties

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
BSBLDR402 Lead effective workplace relationships	BSBWOR401A Establish effective workplace relationships	Updated to meet Standards for Training Packages Title change Minor edits to clarify intent of performance criteria	Equivalent unit

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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBLDR402 Lead effective workplace relationships

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- access and analyse information to achieve planned outcomes
- apply techniques for resolving problems and conflicts and dealing with poor performance within organisational and legislative requirements
- review and improve workplace outcomes in consultation with relevant personnel
- adjust interpersonal style and communications to respond to cultural and social diversity
- apply relationship management and communication skills with a range of people that:
  - demonstrate integrity, respect, empathy and cultural sensitivity and promote trust
  - forge effective relationships with internal and/or external people and help to maintain these networks
  - encourage participation and foster contribution of and respect for ideas and feedback
  - provide support to colleagues to resolve difficulties.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- give examples of how work relationships, and the cultural and social environment, can support or hinder achieving planned outcomes
- explain techniques for developing positive work relationships and building trust and confidence in a team including interpersonal styles, communications, consultation, cultural and social sensitivity, networking
- explain the impact of legislation and organisational policies on workplace relationships
- describe a range of methods and techniques for communicating information and ideas to a range of stakeholders
- outline problems solving methods

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- explain methods to resolve workplace conflict
- explain methods to manage poor work performance
- explain how to monitor, analyse and introduce ways to improve work relationships.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- relevant legislation, regulations, standards and codes
- relevant workplace documentation and resources
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBLDR403 Lead team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit defines skills, knowledge and outcomes required to plan and supervise the performance of the team and develop team cohesion.

It applies team leaders, supervisors and new emerging managers who have an important leadership role in the development of efficient and effective work teams.

Leaders at this level also provide leadership for the team and bridge the gap between the management of the organisation and the team members. As such they must 'manage up' as well as manage their team/s.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and Leadership - Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan to achieve team outcomes	1.1 Lead the team to identify, establish and document team purpose, roles, responsibilities, goals, plans and objectives in consultation with team members 1.2 Engage team members to incorporate innovation and

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ELEMENT	PERFORMANCE CRITERIA
	productivity measures in work plans 1.3 Lead and support team members in meeting expected outcomes
2. Lead team to develop cohesion	2.1 Provide opportunities for input of team members into planning, decision making and operational aspects of work team 2.2 Encourage and support team members to take responsibility for own work and to assist each other in undertaking required roles and responsibilities 2.3 Provide feedback to team members to encourage, value and reward individual and team efforts and contributions 2.4 Recognise and address issues, concerns and problems identified by team members or refer to relevant persons as required 2.5 Model expected behaviours and approaches
3. Participate in and facilitate work team	3.1 Actively encourage team members to participate in and take responsibility for team activities and communication processes 3.2 Give the team support to identify and resolve problems which impede its performance 3.3 Ensure own contribution to work team serves as a role model for others and enhances the organisation's image within the work team, the organisation and with clients/customers
4. Liaise with management	4.1 Maintain open communication with line manager/management at all times 4.2 Communicate information from line manager/management to the team 4.3 Communicate unresolved issues, concerns and problems raised by the team/team members to line manager/management and ensure follow-up action is taken 4.4 Communicate unresolved issues, concerns and problems related to the team/team members raised by line managers/management to the team and ensure follow-up to action is taken

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance	Description

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	Criteria	
Writing	1.1, 4.2	• Prepares workplace plans that communicate intent and elicits feedback clearly and effectively
Oral communication	1.1, 1.3, 2.2, 2.3, 3.1, 3.2, 4.2-4.4	• Engages in discussions or provides information using structure and language appropriate to the audience and situation
Interact with others	1.1-1.3, 2.1-2.5, 3.1, 3.3, 4.1	• Selects and uses appropriate conventions and protocols when communicating with team members • Adapts personal communication style to model required behaviours, build trust and positive working relationships and to show respect for the opinions and values of others • Plays a lead role in situations requiring effective collaboration, demonstrating conflict resolution skills and ability to engage and motivate others
Get the work done	1.1-1.3, 3.2	• Develops, implements and monitors plans and processes to ensure team engagement and effectiveness • Uses formal analytical thinking techniques to identify issues and generate possible solutions, seeking input from others as required

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBLDR403 Lead team effectiveness	BSBWOR402A Promote team effectiveness	Updated to meet Standards for Training Packages Title change Minor edits to clarify intent of performance criteria	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBLDR403 Lead team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- apply knowledge of organisational goals, objectives and plans
- develop a team work plan including documentation of how it was generated and how it will be monitored
- identify and incorporate innovation and productivity measures into a team work plan
- communicate with team members and management to identify and establish the team purpose, roles, responsibilities, goals plans and objectives and resolve problems
- use techniques to consult, encourage, support and provide feedback to team members
- model team leadership behaviours and approaches
- liaise with management to develop the teamwork plan, resolve issues and ensure follow-up action is taken.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must explain principles and techniques associated with:

- delegation and work allocation
- goal setting
- group dynamics and processes
- individual behaviour and difference
- leadership styles
- motivation
- negotiation
- problem solving
- planning

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- workplace innovation
- workplace productivity.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- information about the organisation, including organisational structure, goals, objectives and plans
- case studies, and where possible, real situations
- workplace equipment and resources
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBLDR522 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.
Release 2	This version first released with BSB Business Services Training Package Version 7.1. Release created to amend typographical error with performance criteria.

Application

This unit describes the skills and knowledge required to manage the performance of staff that are direct reports.

The unit applies to individuals who manage people. It covers work allocation and the methods to review performance, reward excellence and provide feedback. The unit makes the link between performance management and performance development and reinforces both functions as a key requirement for effective managers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Leadership

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Allocate work	1.1 Consult relevant groups and individuals on work to be allocated and resources available 1.2 Develop work plans and allocate work according to organisational requirements and operational plans 1.3 Develop and confirm performance standards and key

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ELEMENT	PERFORMANCE CRITERIA
	performance indicators with relevant staff 1.4 Conduct risk analysis according to organisational risk management plan and legal requirements
2. Assess performance	2.1 Review performance management and processes according to legislation, organisational objectives and policies 2.2 Train participants in the performance management and review process 2.3 Conduct performance management according to organisational policies procedures and relevant timelines 2.4 Monitor and evaluate performance according to performance standards and key performance indicators
3. Provide feedback	3.1 Provide informal feedback and coaching to staff 3.2 Advise relevant personnel, where performance is poor and take necessary actions 3.3 Document feedback according to the organisational performance management system 3.4 Conduct formal structured feedback sessions as necessary and according to organisational policy
4. Manage follow up	4.1 Develop performance improvement and development plans according to organisational policies 4.2 Monitor underperforming individuals according to organisational policies 4.3 Respond to underperforming individuals, as required 4.4 Reinforce excellence in performance through recognition and continuous feedback

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Learning	• Consolidates and improves own knowledge and skills by coaching, mentoring or training others
Reading	• Gathers, interprets and analyses texts in organisational documents to facilitate performance management
Writing	• Plans and prepares documents for allocating work and managing performance suitable for the target audience and in accordance with organisational requirements

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Oral Communication	• Uses language and structure appropriate to context and audience to explain expected standards of performance, provide feedback and coach staff
Self-management	• Applies legal and regulatory responsibilities related to own work and the organisation as a whole • Adheres to organisational policies and procedures
Teamwork	• Applies the protocols governing what to communicate to whom and how in a range of work contexts • Collaborates with others to achieve joint outcomes, influencing direction and taking a leadership role on occasion
Planning and organising	• Sequences and schedules complex activities, monitors implementation and manages relevant communication • Seeks advice, feedback and support, as required to assist in the decision-making process • Uses experiences to reflect on the ways in which variables impact on performance

Unit Mapping Information

Supersedes and is equivalent to BSBMGT502 Manage people performance.

Supersedes but is not equivalent to:

- BSBMGT404 Lead and facilitate off-site staff
- BSBSLS502 Lead and manage a sales team.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBLDR522 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage performance of at least two individuals
- manage performance of at least one team.

In the course of the above, the candidate must:

- consult with stakeholders to identify work requirements, performance standards and agreed performance indicators
- develop work plans and allocate work to achieve outcomes efficiently and within organisational and legal requirements
- assess performance against performance indicators according to performance management and review processes
- monitor, evaluate and provide feedback on performance and provide coaching or training, as needed
- keep records and documentation in accordance with the organisational performance management system
- reinforce excellence in performance through recognition and continuous feedback
- respond to underperforming individuals according to organisational policies, as required.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- legislative and regulatory and organisational requirements for performance management and review
- organisational risk management plan
- organisational human resource support services
- organisational performance measurement systems
- key features of unlawful dismissal rules and due process

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- staff development options and information.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- legislation on performance management
- workplace documentation and resources for performance management and review.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBLED401 Develop teams and individuals

Modification History

Release	Comments
Release 2	This version released with BSB Business Services Training Package Version 2.0. Version created to clarify assessment requirements
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to determine individual and team development needs and to facilitate the development of the workgroup.

It applies to individuals with a broad knowledge of learning and development who apply their skills in addressing development needs to meet team objectives. They may have responsibility to provide guidance or to delegate aspects of tasks to others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Workforce Development – Learning and Development

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Determine development needs	1.1 Systematically identify and implement learning and development needs in line with organisational requirements 1.2 Ensure that a learning plan to meet individual and group training and development needs is collaboratively developed, agreed to and

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ELEMENT	PERFORMANCE CRITERIA
	implemented 1.3 Encourage individuals to self-evaluate performance and identify areas for improvement 1.4 Collect feedback on performance of team members from relevant sources and compare with established team learning needs
2. Develop individuals and teams	2.1 Identify learning and development program goals and objectives, ensuring a match to the specific knowledge and skill requirements of competency standards relevant to the industry 2.2 Ensure that learning delivery methods are appropriate to the learning goals, the learning style of participants, and availability of equipment and resources 2.3 Provide workplace learning opportunities, and coaching and mentoring assistance to facilitate individual and team achievement of competencies 2.4 Create development opportunities that incorporate a range of activities and support materials appropriate to the achievement of identified competencies 2.5 Identify and approve resources and time lines required for learning activities in accordance with organisational requirements
3. Monitor and evaluate workplace learning	3.1 Use feedback from individuals or teams to identify and implement improvements in future learning arrangements 3.2 Assess and record outcomes and performance of individuals/teams to determine the effectiveness of development programs and the extent of additional development support 3.3 Negotiate modifications to learning plans to improve the efficiency and effectiveness of learning 3.4 Document and maintain records and reports of competency according to organisational requirements

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description

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Learning	1.1-1.4, 2.1-2.4, 3.1, 3.3	• Uses structured approaches to set goals, monitor progress and adjust learning approaches for self and others • Builds on knowledge and experience to facilitate interaction and learning with others
Reading	1.1, 1.2, 1.4, 2.1, 2.2, 2.4, 2.5, 3.1-3.4	• Analyses textual information from a range of sources to identify organisational requirements • Analyses information from a range of sources to evaluate performance
Writing	1.1, 1.2, 1.4, 2.1, 2.5, 3.1-3.4	• Develops materials to suit the requirements of different roles and individuals in the organisation • Maintains records using correct technical and organisational vocabulary
Oral Communication	1.2, 1.3, 1.4, 2.3, 3.1, 3.3	• Uses vocabulary appropriate to context and to establish a supportive and learning environment • Uses listening and questioning techniques to confirm or show understanding of different perspectives
Navigate the world of work	1.1, 2.5, 3.4	• Recognises and responds to explicit and implicit organisational procedures and protocols Understands how own role meshes with others and contributes to broader goals
Interact with others	1.2, 1.3, 1.4, 2.2, 2.3, 3.1, 3.3	• Selects and uses appropriate conventions and protocols when communicating with co-workers in a range of work contexts • Recognises the importance of building rapport to establish effective working relationships • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction • Negotiates with others to achieve joint/agreeable outcomes playing an active role in facilitating consensus in potentially contentious situations
Get the work done	1.1, 1.2, 1.4, 2.1, 2.2, 2.3, 2.5, 3.1, 3.2, 3.4	• Uses logical planning processes to organise, implement and monitor learning and development needs • Systematically gathers and analyses all relevant information and evaluates options to make informed decisions • Evaluates outcomes of decisions to identify opportunities for improvement

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Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
BSBLED401 Develop teams and individuals Release 2	BSBLED401 Develop teams and individuals Release 1	Updated to clarify assessment requirements	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBLED401 Develop teams and individuals

Modification History

Release	Comments
Release 2	This version released with BSB Business Services Training Package Version 2.0. Version created to clarify assessment requirements
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- systematically identify and implement learning opportunities for others
- collect feedback on team and individual performance
- give and receive feedback from team members to encourage participation in and effectiveness of the team
- collaboratively develop learning plans to match skill needs of individuals and groups
- provide mentoring and coaching assistance to teams and individuals
- monitor and review workplace learning.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- describe facilitation techniques to encourage team development and improvement
- outline organisational policies, plans and procedures for developing teams
- identify career paths and competency standards relevant to the industry.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the workforce learning and development field of work and include access to:

- office equipment and resources
- learning and development plans, policies and procedures
- case studies and, where available, real situations
- interaction with others.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBMGT402 Implement operational plan

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to implement the operational plan by monitoring and adjusting operational performance, planning and acquiring resources and providing reports on performance as required.

It applies to individuals who plan activities to achieve the measurable, stated objectives of the team and the organisation. At this level work will normally be carried out within routine and non-routine methods and procedures which require planning, evaluation, leadership and guidance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and Leadership – Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Implement operational plan	1.1 Collate, analyse and organise details of resource requirements in consultation with relevant personnel, colleagues and specialist resource managers 1.2 Implement operational plans to contribute to the achievement of organisation's performance/business plan 1.3 Identify and use key performance indicators (KPIs) to monitor

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ELEMENT	PERFORMANCE CRITERIA
	operational performance 1.4 Manage contingencies by adjusting the implementation of the operational plan in consultation with others 1.5 Provide assistance in the development and presentation of proposals for resource requirements in line with operational planning processes
2. Implement resource acquisition	2.1 Recruit and induct employees within organisation's policies, practices and procedures 2.2 Implement plans for acquisition of physical resources and services within organisation's policies, practices and procedures and in consultation with relevant personnel
3. Monitor operational performance	3.1 Monitor performance systems and processes to assess progress in achieving profit/productivity plans and targets 3.2 Analyse and use budget and actual financial information to monitor profit/productivity performance 3.3 Identify unsatisfactory performance and take prompt action to rectify the situation according to organisational policies 3.4 Provide mentoring, coaching and supervision to support individuals and teams to use resources effectively, economically and safely 3.5 Present recommendations for variation to operational plans to the designated persons/groups and gain approval 3.6 Implement systems, procedures and records associated with performance in accordance with organisation's requirements

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Learning	3.4	• Actively reinforces learning by applying new knowledge and skills in mentoring, coaching and supervising others
Reading	1.1-1.5, 2.1, 2.2, 3.1, 3.2, 3.6	• Identifies, interprets, analyses and reviews textual information related to the operational plan and

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		monitoring of operational performance
Writing	1.1-1.5, 2.1, 2.2, 3.2-3.6	• Communicates relationships between ideas and information, matching style of writing to purpose and audience • Researches, plans and prepares workplace documentation for relevant stakeholders using organisational formats
Oral Communication	1.1, 1.4, 1.5, 2.1, 2.2, 3.3, 3.4, 3.5	• Participates in a variety of spoken exchanges with a range of audiences varying structure and language to suit the audience
Numeracy	1.1, 1.2, 1.3, 1.4, 1.5, 2.2, 3.1, 3.2, 3.3	• Selects and uses familiar mathematical techniques to organise timely supply of adequate resources for the operational plan and to use budgetary information to monitor performance
Navigate the world of work	1.5, 2.1, 2.2, 3.3, 3.4, 3.6	• Monitors adherence to organisational policies and procedures and considers own role in terms of its contribution to broader goals of the work environment
Interact with others	1.1, 1.4, 1.5, 2.1, 2.2, 3.3, 3.4, 3.5	• Selects and uses appropriate conventions and protocols when communicating with diverse individuals to build rapport, seek or present information • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group communication, influencing direction and taking a leadership role on occasion
Get the work done	1.1, 1.2, 1.3, 1.4, 1.5, 2.2, 3.1, 3.2, 3.3, 3.6	• Takes responsibility for planning, organising, implementing and monitoring tasks required to achieve required outcomes • Uses systematic, analytical processes in complex, non-routine situations, setting goals, gathering relevant information and identifying and evaluating options against agreed criteria • Evaluates effectiveness of decisions in terms of how well they met stated goals • Recognises and addresses an increasing range of familiar problems by implementing contingency plans

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBMGT402 Implement	BSBMGT402A Implement	Updated to meet Standards for	Equivalent unit

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Code and title current version	Code and title previous version	Comments	Equivalence status
operational plan	operational plan	Training Packages. Edits to clarify intent of Performance Criteria.	

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBMGT402 Implement operational plan

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- interact with a range of people/groups to identify resource requirements, performance objectives, systems, procedures and records relating to the operational plan
- vary the operational plan and gain approval to deal with contingencies
- monitor operational performance against the performance objectives and budgets and take action to rectify unsatisfactory performance
- plan and acquire physical and human resources using organisation's systems and procedures
- manage and support personnel to achieve performance objectives. including inducting new employees and providing mentoring and coaching
- present information and recommendations to support implementation and variation of the operational plan
- document and provide reports on performance as required by the organisation.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- describe performance monitoring systems and processes
- describe methods for problem solving
- explain how organisational policies and procedures relate to the operational plan.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- organisational operational plans, policies and procedures
- workplace documentation and resources including budgets, physical and human resource procurement documentation, employee induction and performance monitoring procedures
- case studies and, where possible, real situations.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBMGT403 Implement continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to implement the organisation's continuous improvement systems and processes. It covers using systems and strategies to actively encourage the team to participate in the process, monitoring and reviewing performance, and identifying opportunities for further improvements.

It applies to managers who have an active role in implementing the continuous improvement process to achieve the organisation's objectives. Their position is closely associated with the creation and delivery of products and services which means that they have an important role in influencing the ongoing development of the organisation.

At this level, work will normally be carried out within routine and non-routine methods and procedures, which require planning, evaluation, leadership and guidance of others.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and Leadership – Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Implement continuous improvement systems and	1.1 Implement systems to ensure that individuals and teams are actively encouraged and supported to participate in decision

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ELEMENT	PERFORMANCE CRITERIA
processes	making processes, assume responsibility and exercise initiative 1.2 Communicate the organisation's continuous improvement processes to individuals and teams, and obtain feedback 1.3 Ensure effective mentoring and coaching allows individuals and teams to implement the organisation's continuous improvement processes
2. Monitor and review performance	2.1 Use the organisation's systems and technology to monitor and review progress and to identify ways in which planning and operations could be improved 2.2 Improve customer service through continuous improvement techniques and processes 2.3 Formulate and communicate recommendations for adjustments to those who have a role in their development and implementation
3. Provide opportunities for further improvement	3.1 Implement processes to ensure that team members are informed of savings and productivity/service improvements in achieving the business plan 3.2 Document work performance to aid the identification of further opportunities for improvement 3.3 Manage records, reports and recommendations for improvement within the organisation's systems and processes

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 1.2, 2.1, 3.2, 3.3	• Evaluates and integrates facts and ideas to construct meaning from a range of text types in an effort to implement continuous improvement systems and processes
Writing	1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3	• Selects vocabulary, grammatical structures and conventions appropriate to text • Researches, plans and prepares continuous improvement documentation for relevant stakeholders
Oral	1.2, 1.3, 2.3	• Participates in a variety of spoken exchanges with a range of audiences using structure and language to suit

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Communication		the audience
Navigate the world of work	2.1	• Monitors adherence to organisational policies and procedures and considers own role in terms of its contribution to broader goals of the work environment
Interact the work of others	1.2, 1.3, 2.3, 3.1	• Selects and uses appropriate conventions and protocols when communicating with diverse individuals to seek or share information • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group communication, influencing direction and taking a leadership role on occasion
Get the work done	1.1, 1.3, 2.1, 2.2, 3.1, 3.2, 3.3	• Takes responsibility for planning and organising own workload to achieve required outcomes • Uses systematic, analytical processes in complex, non-routine situations, setting goals, gathering relevant information and identifying and evaluating options against agreed criteria • Evaluates effectiveness of decisions in terms of how well they meet stated goals • Uses digital applications to access and filter data, extract, organise, integrate and share relevant information • Recognises the potential of new approaches to enhance work practices and outcomes

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBMGT403 Implement continuous improvement	BSBMGT403A Implement continuous improvement	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBMGT403 Implement continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- implement continuous improvement systems and provide mentoring and coaching support to enable individuals and teams to participate in decisions, take responsibility, show initiative and implement improvement processes
- implement processes to inform team members about savings and productivity/service improvements achievements
- communicate effectively to support the continuous improvement system and implementation of improvements
- apply continuous improvement to customer services including internal and external customers
- implement, monitor and adjust improvement plans, processes and procedures to improve performance
- document performance to identify further opportunities for improvement
- manage records and reports within the organisation's systems and procedures.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- give examples of continuous improvement processes
- list typical areas of need for coaching and mentoring to support continuous improvement
- explain how change management techniques can support continuous improvement and initiative
- identify the organisation's systems and data that can be used for benchmarking and monitoring performance for continuous improvement.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- relevant workplace documentation and resources
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBMGT502 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to manage the performance of staff who report to them directly. Development of key result areas and key performance indicators and standards, coupled with regular and timely coaching and feedback, provide the basis for performance management.

It applies to individuals who manage people. It covers work allocation and the methods to review performance, reward excellence and provide feedback where there is a need for improvement.

The unit makes the link between performance management and performance development, and reinforces both functions as a key requirement for effective managers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and Leadership – Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Allocate work	1.1 Consult relevant groups and individuals on work to be allocated and resources available

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ELEMENT	PERFORMANCE CRITERIA
	1.2 Develop work plans in accordance with operational plans 1.3 Allocate work in a way that is efficient, cost effective and outcome focussed 1.4 Confirm performance standards, Code of Conduct and work outputs with relevant teams and individuals 1.5 Develop and agree performance indicators with relevant staff prior to commencement of work 1.6 Conduct risk analysis in accordance with the organisational risk management plan and legal requirements
2. Assess performance	2.1 Design performance management and review processes to ensure consistency with organisational objectives and policies 2.2 Train participants in the performance management and review process 2.3 Conduct performance management in accordance with organisational protocols and time lines 2.4 Monitor and evaluate performance on a continuous basis
3. Provide feedback	3.1 Provide informal feedback to staff on a regular basis 3.2 Advise relevant people where there is poor performance and take necessary actions 3.3 Provide on-the-job coaching when necessary to improve performance and to confirm excellence in performance 3.4 Document performance in accordance with the organisational performance management system 3.5 Conduct formal structured feedback sessions as necessary and in accordance with organisational policy
4. Manage follow up	4.1 Write and agree on performance improvement and development plans in accordance with organisational policies 4.2 Seek assistance from human resources specialists, where appropriate 4.3 Reinforce excellence in performance through recognition and continuous feedback 4.4 Monitor and coach individuals with poor performance 4.5 Provide support services where necessary 4.6 Counsel individuals who continue to perform below expectations and implement the disciplinary process if necessary 4.7 Terminate staff in accordance with legal and organisational

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ELEMENT	PERFORMANCE CRITERIA
	requirements where serious misconduct occurs or ongoing poor-performance continues

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Learning	2.2, 3.3, 4.4	• Consolidates and improves own knowledge and skills by coaching, mentoring or training others
Reading	1.2, 1.6, 2.4	• Gathers, interprets and analyses texts in organisational documents to facilitate performance management
Writing	1.2, 1.4, 1.5, 1.6, 2.1, 2.3, 2.4, 3.4, 3.5, 4.1, 4.7	• Plans and prepares documents for allocating work and managing performance suitable for the target audience and in accordance with organisational requirements
Oral Communication	1.1, 1.4, 1.5, 2.2, 2.3, 3.1, 3.2, 3.3, 3.5, 4.2-4.7	• Uses language and structure appropriate to context and audience to explain expected standards of performance, provide feedback and coach staff
Numeracy	1.3, 1.4, 1.5, 1.6, 2.1, 2.4, 3.4, 4.1	• Extracts and evaluates mathematical information embedded in a range of tasks and text relating to performance standards and risk analysis
Navigate the world of work	1.2, 1.6, 2.1, 2.3, 3.4, 3.5, 4.1, 4.7	• Appreciates the implications of legal and regulatory responsibilities related to own work and the organisation as a whole • Monitors adherence to organisational policies and procedures
Interact with others	1.1, 1.3, 1.4, 1.5, 2.2, 3.1, 3.2, 3.3, 4.2-4.6	• Recognises and applies the protocols governing what to communicate to whom and how in a range of work contexts • Collaborates with others to achieve joint outcomes, influencing direction and taking a leadership role on occasion
Get the work done	1.2, 1.3, 1.5, 1.6, 2.1, 2.4, 4.1, 4.2	• Sequences and schedules complex activities, monitors implementation and manages relevant communication • Seeks advice, feedback and support as required to assist in the decision-making process • Uses experiences to reflect on the ways in which

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		variables impact on performance

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBMGT502 Manage people performance	BSBMGT502B Manage people performance	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBMGT502 Manage people performance

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- consult with relevant stakeholders to identify work requirements, performance standards and agreed performance indicators
- develop work plans and allocate work to achieve outcomes efficiently and within organisational and legal requirements
- monitor, evaluate and provide feedback on performance and provide coaching or training, as needed
- reinforce excellence in performance through recognition and continuous feedback
- seek assistance from human resources specialists where appropriate
- keep records and documentation in accordance with the organisational performance management system.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline relevant legislative and regulatory requirements
- outline relevant awards and certified agreements
- explain performance measurement systems utilised within the organisation
- explain unlawful dismissal rules and due process
- describe staff development options and information.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- relevant legislation
- workplace documentation and resources
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBMGT516 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to lead and manage continuous improvement systems and processes. Particular emphasis is on the development of systems and the analysis of information to monitor and adjust performance strategies, and to manage opportunities for further improvements.

It applies to individuals who take an active role in managing a continuous improvement process in order to achieve an organisation's objectives.

At this level, work will normally be carried out using complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem-solving and decision-making strategies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Management and leadership – Management

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Lead continuous improvement systems and processes	1.1 Develop strategies to ensure that team members are actively encouraged and supported to participate in decision-making processes, assume responsibility and exercise initiative as

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ELEMENT	PERFORMANCE CRITERIA
	appropriate 1.2 Establish systems to ensure that the organisation's continuous improvement processes are communicated to stakeholders 1.3 Ensure that change and improvement processes meet sustainability requirements 1.4 Develop effective mentoring and coaching processes to ensure that individuals and teams are able to implement and support the organisation's continuous improvement processes 1.5 Ensure that insights and experiences from business activities are captured and accessible through knowledge management systems
2. Monitor and adjust performance strategies	2.1 Develop strategies to ensure that systems and processes are used to monitor operational progress and to identify ways in which planning and operations could be improved 2.2 Adjust and communicate strategies to stakeholders according to organisational procedures
3. Manage opportunities for further improvement	3.1 Establish processes to ensure that team members are informed of outcomes of continuous improvement efforts 3.2 Ensure processes include recording of work team performance to assist in identifying further opportunities for improvement 3.3 Consider areas identified for further improvement when undertaking future planning

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 3.3	• Identifies and extracts relevant information from a range of complex texts • Locates, interprets and analyses workplace documentation to gather information relating to continuous improvement
Writing	1.1, 1.2, 1.4, 1.5, 2.1, 2.2, 3.1-3.3	• Develops complex texts related to continuous improvement processes according to organisational requirements

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		• Ensures the vocabulary, grammatical structures and conventions are appropriate for the context and target audience
Oral Communication	1.1, 1.2, 1.4, 2.2	• Presents information to a range of audiences using appropriate structure and language • Listens and comprehends information from a variety of spoken exchanges with clients, co-workers and other stakeholders • Confirms understanding through questioning and active listening
Navigate the world of work	1.1-1.3, 2.1, 2.2	• Develops strategies to enable compliance with legislative requirements and achievement of the organisation's goals • Monitors adherence to organisational policies, procedures and protocols and considers own role in terms of its contribution to broader goals of the work environment
Interact with others	1.1, 1.2, 1.4, 2.2	• Identifies and uses appropriate conventions and protocols when communicating with colleagues and external stakeholders • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction and influencing direction
Get the work done	1.1, 1.2, 1.4, 1.5, 2.1, 3.1, 3.2, 3.3	• Takes responsibility for developing, implementing and monitoring systems and processes to achieve organisational outcomes • Uses analytical and lateral thinking to review current practices and develop ideas for improvement • Reflects on the ways in which digital systems and tools are used, or could be used, to achieve work goals

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBMGT516 Facilitate continuous improvement	BSBMGT516C Facilitate continuous improvement	Updated to meet Standards for Training Packages	Equivalent unit

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Links

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Assessment Requirements for BSBMGT516 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to establish systems and processes for continuous improvement that:

- facilitate effective contributions to and communications about continuous improvement processes and outcomes
- address sustainability requirements
- incorporate mentoring, coaching and other support to enable people to participate effectively in continuous improvement processes
- capture insights, experiences and ideas for improvements and incorporate them into the organisation's knowledge management systems and future planning.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain how systems and procedures can support effective continuous improvement
- explain how continuous improvement systems and processes relate to other business systems and requirements including, knowledge management, quality, performance management and sustainability.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the management and leadership field of work and include access to:

- relevant workplace documentation and resources
- case studies and, where possible, real situations
- interaction with others.

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Assessors must satisfy NVR/AQTF assessor requirements.

Links

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BSBOPS203 Deliver a service to customers

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to deliver aspects of customer service at an introductory level. It includes creating a relationship with customers, identifying their needs, delivering services or products, and processing customer feedback.

The unit applies to those who perform a range of routine tasks in the workplace using a limited range of practical skills and fundamental knowledge of customer service in a defined context under direct supervision or with limited individual responsibility.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Business Competence – Business Operations

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish contact with customers	1.1 Greet customers according to organisational requirements 1.2 Share relevant information with customers 1.3 Identify and respond to specific customer requirements 1.4 Express interest in customer needs and develop rapport with customer
2. Identify customer needs	2.1 Ask questions to identify customer needs 2.2 Assess customer needs for urgency and identify priorities for service delivery 2.3 Provide customer with information about available options

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ELEMENT	PERFORMANCE CRITERIA
	2.4 Assess limitations in addressing customer needs and seek assistance from designated persons, where required
3. Provide service to customers	3.1 Confirm details of service and delivery with customer according to organisational requirements 3.2 Convey information regarding problems and delays, and follow-up within appropriate timeframes, where required 3.3 Identify opportunities to enhance the quality of service and products, and take action to improve the service
4. Process customer feedback	4.1 Seek customer feedback and handle according to organisational and legislative requirements 4.2 Record feedback and communication between customer and the organisation according to organisational requirements 4.3 Identify any unmet customer needs and discuss suitability of alternative products or services 4.4 Encourage customers to maintain contact with organisation for future needs

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Description
Reading	• Identifies requirements from organisational policy and procedure documents • Interprets product and service information in a range of formats to provide customer advice
Writing	• Records customer information according to organisational requirements
Oral communication	• Provides information and advice using structure and language to suit the audience • Asks questions and listens to gain information and confirm understanding
Planning and organising	• Follows organisational procedures and practices relevant to own role
Teamwork	• Uses accepted communication practices to establish connections, build rapport and develop professional working relationships • Adjusts personal communication style in response to the opinions, values and needs of others

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Skill	Description
Initiative and enterprise	• Identifies opportunities to enhance work practices and outcomes
Problem solving	• Addresses routine problems in familiar work contexts

Unit Mapping Information

Supersedes and is equivalent to BSBCUS201 Deliver a service to customers.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBOPS203 Deliver a service to customers

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- deliver a service to at least three different customers.

In the course of the above, the candidate must:

- greet the customer and establish rapport according to organisational requirements
- identify customer needs using interpersonal skills
- provide prompt service to address customer needs
- identify and follow up opportunities to increase the quality of service and products
- respond to and record all customer feedback according to organisational standards, policies and procedures.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- key provisions of customer service legislation and consumer law
- requirements for responding to the needs of customers from a diverse background
- workplace organisational policies and procedures relating to customer service and the customer service process.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documents, and organisational policies and procedures for customer service
- examples of customer complaints and feedback.

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Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBSTR501 Establish innovative work environments

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to create an environment that enables and supports practice which focuses on a holistic approach to the integration of innovation across all areas of work practice.

The unit applies to individuals working in leadership or management roles in any industry or community context. The individual could be employed by the organisation, but may also be an external contractor, the leader of a cross organisation team or of a self-formed team of individuals.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking and Problem Solving – Business Strategy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Establish work practices	1.1 Identify relevant stakeholders 1.2 Identify organisational objectives and practices 1.3 Evaluate current work conditions 1.4 Determine working conditions that allow innovative practices according to organisational policies and procedures 1.5 Identify organisational resources relating to innovation 1.6 Build and lead team and maximise opportunities for innovation
2. Create an innovative	2.1 Evaluate the impacts of changing work environment

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ELEMENT	PERFORMANCE CRITERIA
environment	2.2 Collaborate with stakeholders and develop ideas for enhancing work environment 2.3 Identify and select resources required for enhancing work environment 2.4 Assess the ability of the workspace to support innovation 2.5 Assist team members to adapt and perform in new work environment
3. Implement innovative work environment	3.1 Encourage creative mindsets, collaborative working and development of positive workplace relationships 3.2 Reinforce the value of innovation according to organisational vision and objectives 3.3 Take risks to open up opportunities for innovation 3.4 Select ways of celebrating and encouraging innovation 3.5 Encourage and support evaluation of innovative ideas
4. Share and evaluate innovative ideas and work environment	4.1 Share relevant information, knowledge and skills on innovative practices with stakeholders 4.2 Provide and encourage formal and informal learning opportunities to develop skills required for innovation 4.3 Create opportunities where individuals can learn from the experience of others 4.4 Seek and respond to suggestions, improvements and innovations from all team members

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Interprets and evaluates information that may deal with complex ideas related to issues both within and outside a given workplace context
Writing	• Develops information for others using language to suit the context and audience
Oral communication	• Presents ideas and concepts to a range of audiences using structure and language to suit the audience • Uses active listening and questioning to discuss and clarify information and to confirm understanding
Self-management	• Takes responsibility for implementing practices and procedures to achieve organisational objectives in innovation according to role

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SKILL	DESCRIPTION
	requirements • Accepts responsibility for planning and implementing tasks and practices to achieve organisational goals, negotiating key aspects with others and taking into account current capabilities and needs
Initiative and enterprise	• Develops new and innovative ideas through exploration, evaluation, analysis and critical thinking
Teamwork	• Uses required communication techniques to build rapport and foster strong relationships with co-workers in a range of work contexts • Uses inclusive and collaborative techniques to share, promote and convey complex information about new ideas and systems within the workplace • Facilitates a climate where people feel comfortable suggesting and discussing improvements and new ideas
Problem Solving	• Uses problem solving processes to identify, assess and respond to challenges and risks around innovation

Unit Mapping Information

No equivalent unit. Supersedes but is not equivalent to:

- BSBINN501 Establish systems that support innovation
- BSBINN502 Build and sustain an innovative work environment.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBSTR501 Establish innovative work environments

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- establish at least two different procedures and practices that foster innovation in areas of work practice, including at least three of the following:
  - collaborative work arrangements
  - building team capacity to contribute to innovation
  - providing formal and informal learning opportunities
  - evaluating ideas of innovation in work environment
  - celebrating and encouraging innovation
  - consulting with relevant stakeholders
  - changing physical work environment, including designing, fitting-out and decorating workspaces
  - communicating and sharing of ideas and feedback.

In the course of the above, the candidate must:

- reinforce the value of innovation to the vision and objectives of the organisation
- model behaviour, including:
  - being receptive to ideas
  - giving constructive advice
  - establishing and maintaining relationships based on mutual respect and trust
  - taking considered risks that provide opportunities for innovation
- support innovation and collaboration of ideas to make improvements.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- concepts and theories of innovation

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- context for innovation in the workplace, including:
  - core business values
  - overall objectives
  - broader environmental context
  - value and benefit of innovative ideas and projects
- factors and tools that motivate individuals
- creative thinking and innovative work practices
- ways of celebrating and promoting innovation in the workplace
- approaches to management and leadership and how they support and hinder innovation
- challenges and barriers to innovation and ways of overcoming them, including:
  - rewarding and celebrating innovation
  - coaching and learning
  - modelling behaviour and managing the physical environment.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- relevant legislation and codes of practice
- relevant organisational policies and procedures
- workplace equipment and resources.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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BSBSTR502 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to lead and manage continuous improvement systems and processes. Particular emphasis is on the development of systems and the analysis of information to monitor and adjust performance strategies, and to manage opportunities for further improvements.

The unit applies to individuals who take an active role in managing a continuous improvement process in order to achieve an organisation's objectives. At this level, work will normally be carried out using complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem-solving and decision-making strategies.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Critical Thinking and Problem Solving – Business Strategy

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish systems and processes	1.1 Identify current systems and processes that facilitate continuous improvement 1.2 Identify and define improvement needs and opportunities for the organisation 1.3 Develop decision-making processes to assist continuous improvement and communicate to relevant stakeholders 1.4 Develop strategies for continuous improvement and encourage

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ELEMENT	PERFORMANCE CRITERIA
	team members to participate in decision-making processes 1.5 Develop knowledge management systems to capture team progress, insights and experiences from business activities 1.6 Develop new systems and processes that facilitate continuous improvement according to improvement needs and opportunities 1.7 Establish processes that confirm team members are informed about continuous improvement outcomes
2. Monitor and adjust performance strategies	2.1 Confirm relevant systems and processes meet organisation sustainability requirements 2.2 Confirm team progress, insights and experiences are captured and accessible using knowledge management systems 2.3 Coach individuals and teams to implement and support continuous improvement systems and processes 2.4 Identify and evaluate ways in which planning and operations could be improved 2.5 Make recommendations and communicate strategies to relevant stakeholders
3. Manage opportunities for further improvement	3.1 Evaluate outcomes and identify opportunities for improvement 3.2 Seek feedback from relevant stakeholders on systems and processes 3.3 Identify other areas for improvement and document feedback for future planning

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Reading	• Identifies and extracts required information from a range of complex texts • Locates, interprets and analyses workplace documentation to gather information relating to continuous improvement
Writing	• Develops complex texts related to continuous improvement processes according to organisational requirements • Ensures the vocabulary, grammatical structures and conventions are required for the context and target audience
Oral	• Presents information to a range of audiences using appropriate structure and language

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SKILL	DESCRIPTION
communication	• Listens and comprehends information from a variety of spoken exchanges with clients, co-workers and other stakeholders • Confirms understanding through questioning and active listening
Initiative and enterprise	• Monitors adherence to organisational policies, procedures and protocols and considers own role in terms of its contribution to broader goals of the work environment • Identifies and uses appropriate conventions and protocols when communicating with colleagues and external stakeholders
Problem solving	• Uses analytical and lateral thinking to review current practices and develop ideas for improvement
Teamwork	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction and influencing direction
Self-management	• Takes responsibility for developing, implementing and monitoring systems and processes to achieve organisational outcomes
Technology	• Reflects on the ways in which digital systems and tools are used, or could be used, to achieve work goals

Unit Mapping Information

Supersedes and is equivalent to BSBMGT516 Facilitate continuous improvement.

Supersedes but is not equivalent to BSBCUE501 Develop business continuity strategy.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBSTR502 Facilitate continuous improvement

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- lead and manage continuous improvement systems and processes for at least one organisation or work area.

In the course of the above, the candidate must:

- address organisational sustainability requirements
- incorporate mentoring, coaching and other support to enable individuals to participate in continuous improvement processes
- capture progress, insights and experiences using established knowledge management systems
- encourage participation in decision making processes and ideas for continuous improvement.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- systems and processes facilitating continuous improvement
- common decision-making processes
- organisational policies and procedures relating to digital systems, decision-making processes and continuous improvement systems
- business systems and requirements, including:
  - knowledge management
  - quality
  - sustainability
  - performance management.

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Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documentation and resources relevant to performance evidence
- organisational policies and procedures relevant to performance evidence.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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BSBTWK502 Manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Application

This unit describes the skills and knowledge required to lead teams in the workplace and to actively engage with the management of the organisation.

The unit applies to individuals working at a managerial level who lead and build a positive culture within their work teams. At this level, work will normally be carried out using complex and diverse methods and procedures requiring the exercise of considerable discretion and judgement. It will also involve using a range of problem solving and decision-making strategies.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Social Competence – Teamwork and Relationships

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish team performance plan	1.1 Identify team purpose, roles, and responsibilities according to organisational and task objectives 1.2 Develop performance plans with expected outcomes, key performance indicators (KPIs) and goals for work team 1.3 Support team members in meeting expected performance outcomes
2. Develop and facilitate team cohesion	2.1 Develop strategies for facilitating team member input into planning, decision making and operational aspects of team tasks 2.2 Develop or modify policies and procedures for promoting team

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ELEMENT	PERFORMANCE CRITERIA
	member accountability for personal work and team tasks 2.3 Provide feedback to team members on team effort and contributions 2.4 Develop processes for identifying and addressing issues, concerns and problems identified by team members
3. Facilitate teamwork	3.1 Encourage team members to participate in and to take responsibility for team activities 3.2 Support the team in identifying and resolving work performance problems 3.3 Promote work team collaboration through individual behaviour
4. Liaise with stakeholders	4.1 Establish and maintain open communication processes with relevant stakeholders 4.2 Communicate information from line management to the team 4.3 Communicate and follow-up unresolved issues, concerns and problems raised by team members with line management 4.4 Address unresolved issues, concerns and problems raised by stakeholders

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

SKILL	DESCRIPTION
Reading	• Analyses and interprets textual information from the organisation's policies, goals and objectives to establish team goals or to determine corrective action
Writing	• Prepares workplace documentation that communicates complex information clearly and effectively
Oral Communication	• Engages in discussions or provides information using appropriate vocabulary and non-verbal features • Uses listening and questioning techniques to confirm understanding and to engage the audience
Enterprise and initiative	• Identifies how own role contributes to broader organisational goals • Modifies or develops policies and procedures to achieve organisational goals
Teamwork	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Uses interpersonal skills to gain trust and confidence of team and

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	provides feedback to others in forms that can be understood and used • Adapts personal communication style to build positive working relationships and to show respect for the opinions, values and particular needs of others
Planning and organising	• Develops, implements and monitors plans and processes to ensure team effectiveness • Monitors and actively supports processes and development activities to ensure the team is focused on work outcomes • Plans for unexpected outcomes and implements creative responses to overcome challenges

Unit Mapping Information

Supersedes and is equivalent to BSBWOR502 Lead and manage team effectiveness.

Supersedes but is not equivalent to:

- BSBMGT520 Plan and manage the flexible workforce
- BSBWRK409 Prepare for and participate in dispute resolution.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBTWK502 Manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 7.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- manage the effectiveness of at least one work team.

In the course of the above, the candidate must:

- provide feedback to encourage, value and reward others
- model desired behaviour and practices
- encourage and foster shared understanding of purpose, roles and responsibilities
- support team to meet expected performance outcomes including providing formal and informal learning opportunities as needed
- develop performance plans with key performance indicators (KPIs), outputs and goals for individuals or the team which incorporate input from stakeholders
- communicate effectively with a range of stakeholders about team performance plans and team performance
- evaluate and take necessary corrective action regarding unresolved issues, concerns and problems raised by internal or external stakeholders.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- impacts of group dynamics on team performance
- methods of establishing team activities including communication processes
- strategies that can support team cohesion, participation and performance
- strategies for gaining consensus
- issue resolution strategies.

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Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- workplace documents relevant to team task objectives.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBWOR404 Develop work priorities

Modification History

Release	Comments
Release 2	This version first released with BSB Business Services Training Package Version 1.1. Version created to correct mapping table information
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to monitor and obtain feedback on own work performance and access learning opportunities for professional development.

This unit applies to individuals who are required to design their own work schedules and work plans and to establish priorities for their work. They will typically hold some responsibilities for the work of others and have some autonomy in relation to their own role.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Industry Capability – Workplace Effectiveness

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan and complete own work schedule	1.1 Prepare workgroup plans which reflect consideration of resources, client needs and workgroup targets 1.2 Analyse and incorporate work objectives and priorities into personal schedules and responsibilities

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ELEMENT	PERFORMANCE CRITERIA
	1.3 Identify factors affecting the achievement of work objectives and establish contingencies and incorporate them into work plans 1.4 Efficiently and effectively use business technology to manage and monitor planning completion and scheduling of tasks
2. Monitor own work performance	2.1 Identify and analyse personal performance through self-assessment and feedback from others on the achievement of work objectives 2.2 Seek and evaluate feedback on performance from colleagues and clients in the context of individual and group requirements 2.3 Routinely identify and report on variations in the quality of service and performance in accordance with organisational requirements
3. Co-ordinate professional development	3.1 Assess personal knowledge and skills against organisational benchmarks to determine development needs and priorities 3.2 Research and identify sources and plan for opportunities for improvement in consultation with colleagues 3.3 Use feedback to identify and develop ways to improve competence within available opportunities 3.4 Identify, access and complete professional development activities to assist career development 3.5 Store and maintain records and documents relating to achievements and assessments in accordance with organisational requirements

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Learning	3.1, 3.2, 3.3, 3.4	• Develops strategies to reflect on own performance, obtain feedback, and plan and source professional development opportunities
Reading	1.2, 2.1, 2.3, 3.1, 3.5	• Recognises and interprets textual information from relevant sources to understand organisation's policies and practices

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Writing	1.1, 1.3, 2.2, 2.3, 3.2, 3.5	• Prepares written reports and workplace documentation that communicate complex information clearly and effectively
Oral Communication	2.2, 2.3, 3.2	• Provides or seeks information using language suitable to audience and context • Employs listening and questioning techniques to confirm understanding
Numeracy	1.1, 1.2, 1.3	• Interprets numerical information related to budgets and timeframes
Navigate the world of work	1.2, 2.1, 2.3, 3.1, 3.5	• Identifies and understands roles and responsibilities in relation to organisational objectives, policies and procedures
Interact with others	2.2, 2.3, 3.2	• Selects and uses appropriate practices when communicating with internal and external stakeholders to seek or share information • Establishes and builds rapport and relationships with others to foster a culture of trust and honesty in communications
Get the work done	1.1-1.4, 2.3, 3.1, 3.2, 3.4, 3.5	• Plans, organises and implements tasks to meet organisational requirements • Systematically gathers and analyses information and evaluates options in order to anticipate potential problems and develop contingency plans • Uses the main features and functions of digital technologies and tools to complete work tasks efficiently and effectively

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBWOR404 Develop work priorities	BSBWOR404B Develop work priorities	Updated to meet Standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBWOR404 Develop work priorities

Modification History

Release	Comments
Release 2	This version first released with BSB Business Services Training Package Version 1.1. Version created to correct mapping table information
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- prepare and communicate own work plan
- schedule work objectives and tasks to support the achievement of the workgroup goals
- review own work performance against workgroup objectives through self-assessment and seeking and acting on feedback from clients and colleagues
- plan and access learning opportunities to extend personal work competencies.

Note: if a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain how business technology applications can be used to schedule tasks and plan work
- explain techniques to prepare personal plans and establish priorities
- identify methods to identify and prioritise personal learning needs
- outline a range of professional development options
- explain methods to elicit, analyse and interpret feedback
- provide a detailed explanation of methods that can be used to evaluate own performance.

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Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the industry capability - workplace effectiveness field of work and include access to:

- workplace documentation including policies and procedures, and benchmarks for work group productivity and performance
- workplace equipment and resources
- case studies and, where possible, real situations
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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BSBWOR502 Lead and manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to lead teams in the workplace and to actively engage with the management of the organisation.

It applies to individuals working at a managerial level who facilitate work teams and build a positive culture within their work teams. At this level, work will normally be carried out using complex and diverse methods and procedures requiring the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Industry Capability – Workplace Effectiveness

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Establish team performance plan	1.1 Consult team members to establish a common understanding of team purpose, roles, responsibilities and accountabilities in accordance with organisational goals, plans and objectives 1.2 Develop performance plans to establish expected outcomes, outputs, key performance indicators (KPIs) and goals for work team 1.3 Support team members in meeting expected performance

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ELEMENT	PERFORMANCE CRITERIA
	outcomes
2. Develop and facilitate team cohesion	2.1 Develop strategies to ensure team members have input into planning, decision making and operational aspects of work team 2.2 Develop policies and procedures to ensure team members take responsibility for own work and assist others to undertake required roles and responsibilities 2.3 Provide feedback to team members to encourage, value and reward individual and team efforts and contributions 2.4 Develop processes to ensure that issues, concerns and problems identified by team members are recognised and addressed
3. Facilitate teamwork	3.1 Encourage team members and individuals to participate in and to take responsibility for team activities, including communication processes 3.2 Support the team in identifying and resolving work performance problems 3.3 Ensure own contribution to work team serves as a role model for others and enhances the organisation's image for all stakeholders
4. Liaise with stakeholders	4.1 Establish and maintain open communication processes with all stakeholders 4.2 Communicate information from line manager/management to the team 4.3 Communicate unresolved issues, concerns and problems raised by team members and follow-up with line manager/management and other relevant stakeholders 4.4 Evaluate and take necessary corrective action regarding unresolved issues, concerns and problems raised by internal or external stakeholders

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description

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Reading	1.1, 4.4	• Analyses and interprets textual information from the organisation's policies, goals and objectives to establish team goals or to determine corrective action
Writing	1.2, 2.1, 2.2, 2.4, 4.2, 4.3, 4.4	• Prepares written reports and workplace documentation that communicate complex information clearly and effectively
Oral Communication	1.1, 2.3, 3.1, 4.1, 4.2, 4.3	• Engages in discussions or provides information using appropriate vocabulary and non-verbal features • Uses listening and questioning techniques to confirm understanding and to engage the audience
Navigate the world of work	1.1, 2.1, 2.2, 3.3	• Understands how own role contributes to broader organisational goals • Modifies or develops policies and procedures to achieve organisational goals
Interact with others	1.1, 1.3, 2.2, 2.3, 3.1, 3.2, 4.2, 4.3	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Uses interpersonal skills to gain trust and confidence of team and provides feedback to others in forms that they can understand and use • Adapts personal communication style to build positive working relationships and to show respect for the opinions, values and particular needs of others • Plays a lead role in situations requiring effective collaboration, demonstrating high level conflict resolution skills and ability to engage and motivate others
Get the work done	1.2, 2.1, 2.2, 2.4, 3.2, 4.1, 4.3, 4.4	• Develops, implements and monitors plans and processes to ensure team effectiveness • Monitors and actively supports processes and development activities to ensure the team is focused on work outcomes • Plans for unexpected outcomes and implements creative responses to overcome challenges

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBWOR502 Lead and manage team effectiveness	BSBWOR502B Ensure team effectiveness	Updated to meet Standards for Training Packages	Equivalent unit

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Code and title current version	Code and title previous version	Comments	Equivalence status
		Title change	

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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Assessment Requirements for BSBWOR502 Lead and manage team effectiveness

Modification History

Release	Comments
Release 1	This version first released with BSB Business Services Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- use leadership techniques and strategies to facilitate team cohesion and work outcomes including:
  - encouraging and fostering shared understanding of purpose, roles and responsibilities
  - identifying and resolving problems
  - providing feedback to encourage, value and reward others
  - modelling desired behaviour and practices
- develop policies and procedures to ensure team members take responsibility for own work and assist others to undertake required roles and responsibilities
- establish processes to address issues and resolve performance issues
- support team to meet expected performance outcomes including providing formal and informal learning opportunities as needed
- develop performance plans with key performance indicators (KPIs), outputs and goals for individuals or the team which incorporate input from stakeholders
- communicate effectively with a range of stakeholders about team performance plans and team performance
- facilitate two-way flow of information between team and management relevant to team performance
- evaluate and take necessary corrective action regarding unresolved issues, concerns and problems raised by internal or external stakeholders.

Note: if a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain how group dynamics can support or hinder team performance

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- outline strategies that can support team cohesion, participation and performance
- explain strategies for gaining consensus
- explain issue resolution strategies.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the industry capability - workplace effectiveness field of work and include access to:

- workplace documents
- case studies and, where possible, real situations
- office equipment and resources
- interaction with others.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=11ef6853-ceed-4ba7-9d87-4da407e23c10

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CPCCWHS1001 Prepare to work safely in the construction industry

Modification History

Release	Comment
Version 1	Replaces superseded equivalent CPCCOHS1001A Work safely in the construction industry.

Application

This unit of competency specifies the mandatory work health and safety training required prior to undertaking construction work. The unit requires the person to demonstrate personal awareness and knowledge of health and safety legislative requirements in order to work safely and prevent injury or harm to self and others. It covers identifying and orally reporting common construction hazards, understanding basic risk control measures, and identifying procedures for responding to potential incidents and emergencies. It also covers correctly selecting and fitting common personal protective equipment (PPE) used for construction work.

This unit meets the general construction induction training requirements of:

- Part 1.1 Definitions and Part 6.5 of the Model Work Health and Safety Regulations;
- Division 11 of Part 3 of the Occupational Safety and Health Regulations 1996 for Western Australia; and
- Division 3 of Part 5.1 of the Occupational Health and Safety Regulations 2007 for Victoria.

It is expected that site-specific induction training will be conducted prior to conducting construction work.

Licensing, legislative, regulatory or certification requirements apply to this unit. Relevant work health and safety state and territory regulatory authorities should be consulted to confirm jurisdictional requirements.

Pre-requisite Unit

Nil

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Unit Sector

Construction

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range of conditions.
1.	Identify health and safety legislative requirements of construction work.	1.1. Basic roles, responsibilities and rights of duty holders are identified and explained according to ***jurisdictional health and safety legislative requirements***.
		1.2. Duty of care requirements are identified.
		1.3. Construction safe work practices are identified and explained.
2.	Identify construction hazards and risk control measures.	2.1. Basic principles of risk management are identified.
		2.2. Construction hazards are identified and discussed.
		2.3. Purpose and use of PPE are identified and demonstrated.
		2.4. Measures for controlling hazards are identified.
3.	Identify health and safety communication and reporting processes.	3.1. Health and safety documents are identified and discussed.
		3.2. Roles of designated health and safety personnel are identified and explained.
		3.3. Safety signs and symbols are identified and explained.
		3.4. Procedures for reporting hazards, incidents and injuries are identified.
4.	Identify incident and emergency response	4.1. Procedures for responding to incidents and emergencies are identified and explained.
		4.2. Procedures for accessing first aid are identified.

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procedures.	4.3.	Types and purpose of fire safety equipment are identified and discussed.

Foundation Skills

This section describes the language, literacy, numeracy and employment skills essential to performance in this unit but not explicit in the performance criteria.

Skill	Performance feature
Numeracy skills to:	• locate and recognise numbers commonly used in safety signs.
Oral communication skills to:	• ask questions to clarify instructions • listen to instructions to identify key safety information • tell another person about a construction problem or hazard.
Reading skills to:	• follow simple pictorial safety instructions • follow simple safety instructions that are written in English.
Problem-solving skills to:	• select risk control measures.

Range of Conditions

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

Jurisdictional health and safety legislative requirements must include at least one of the following state and territory Acts or their equivalent:	• Australian Capital Territory: Work Health and Safety Act 2011 • New South Wales: Work Health and Safety Act 2011 • Northern Territory: Work Health and Safety (National Uniform Legislation) Act 2011 • Queensland: Work Health and Safety Act 2011 • South Australia: Work Health and Safety Act 2012 • Tasmania: Work Health and Safety Act 2012 • Victoria: Occupational Health and Safety Act 2004 • Western Australia: Occupational Safety and Health Act 1984.

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Unit Mapping Information

Supersedes and is equivalent to CPCCOHS1001A Work safely in the construction industry

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

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Assessment Requirements for CPCCWHS1001 Prepare to work safely in the construction industry

Modification History

Release	Comment
Version 1	Replaces superseded equivalent CPCCOHS1001A Work safely in the construction industry.

Performance Evidence

A person demonstrating competency in this unit must satisfy the requirements of the elements, performance criteria, foundation skills, and range of conditions of this unit, in addition to the specific performance and knowledge evidence described below.

The person must:

- identify and orally report two construction hazards
- orally explain how risk could be reduced or removed in relation to those two hazards
- select appropriate personal protective equipment (PPE) to control the risk
- orally explain basic procedures for responding to incidents and emergencies, including types and purpose of the following fire safety equipment:
  - fire blankets
  - fire extinguishers, including water, carbon dioxide, powder and foam
  - hose reels and mains
- identify and orally explain the meaning of required safety signs and symbols
- orally explain the purpose of job safety analyses (JSAs), safe work method statements (SWMS) and safety data sheets (SDS)
- orally explain the roles of the following designated health and safety personnel:
  - first aid officers
  - work health and safety representatives
  - work health and safety committee members
  - supervisors.

The person must also demonstrate correctly fitting to themselves the PPE listed below:

- eye protection
- hearing protection
- hard hat

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- high visibility retro reflective vest.

Knowledge Evidence

A person must demonstrate knowledge of:

- basic duty of care, and the roles, rights and responsibilities of business owners and workers in relation to working safely while undertaking construction work
- basic meaning of the terms ‘hazard’ and ‘risk’
- basic principles of risk management, including the following five steps in order:
  - identify hazard
  - assess risk
  - consult and report
  - control hazard
  - review
- basic procedures for accessing first aid
- construction hazards, including those relating to:
  - asbestos
  - confined spaces
  - electrical: power lines, cords and equipment
  - excavations and trenches, including underground services
  - dust
  - falling objects
  - hazardous substances and dangerous goods
  - hot and cold work environments
  - manual handling
  - noise
  - plant and equipment operation
  - traffic and mobile plant
  - unplanned collapse
  - ultraviolet radiation
  - working at heights, including scaffolding
- construction work that requires a high risk work licence
- types, purpose and use of PPE used in construction, as specified in the performance evidence, and including safety footwear, harnesses and respiratory protection, and ultraviolet (UV) protective clothing and sunscreen
- construction emergencies, including:
  - chemical spill
  - fire
  - injury to personnel
  - structural collapse
  - toxic or flammable vapour emission

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    - vehicle or mobile plant accident
- construction incidents, including:
    - incidents resulting in personal injury or damage to property
    - near misses or dangerous occurrences that do not cause injury but may pose an immediate and significant risk to persons or property, and need to be reported so that action can be taken to prevent recurrence
- safe work practices that should be followed in construction work, including:
    - accessing and using site amenities for drinking water, hand washing and toilets
    - following safety procedures when performing work tasks and using equipment
    - identifying and reporting hazards, incidents and injuries in the workplace
    - keeping the work area clean, tidy and free from debris
    - not using or being affected by drugs and/or alcohol while at work
    - preventing bullying and harassment in the workplace
    - selecting and using required PPE
    - smoking only in designated areas
    - storing and removing waste and debris in designated areas
- meanings and symbols associated with construction safety signs, symbols and tags, including:
    - emergency information signs: exits, emergency equipment and first aid
    - fire signs: location of fire alarms and firefighting equipment
    - hazard signs and symbols: danger and warning
    - regulatory signs and symbols: prohibition, mandatory and limitation or restriction
    - safety and lockout tags: danger and out-of-service tags.

Assessment Conditions

The following must be present and available to learners during assessment activities:

- equipment:
    - all of the PPE listed in the performance evidence
- specifications:
    - state or territory Act relevant to the location of the learner, as specified in the range of conditions.

The assessment of performance evidence must be done by direct observation of the learner by an assessor, either by an assessor observing the learner physically and/or by an assessor observing the learner via audio and visual media in real time.

Assessor requirements

As a minimum, assessors must satisfy the assessor requirements in the Standards for Registered Training Organisations (RTOs) current at the time of assessment.

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Assessors must hold the unit *CPCCOHS2001A Apply OHS requirements, policies and procedures in the construction industry*, or its successor.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

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CPPBDN5013A Develop and collaborate on building information models for small-scale building design projects

Modification History

New unit

Unit Descriptor

This unit of competency specifies the outcomes required to develop three-dimensional (3-D) models of small-scale building design projects covered by the Building Code of Australia (BCA), except construction Type A buildings, into true building information models (BIM).

It also covers adding and adjusting values of components of building designs, collaborating with consultants and contractors from other disciplines, working live within the model alongside other disciplines and creating project documentation using modelling software programs.

Application of the Unit

This unit of competency supports building designers who create and use BIMs to optimise productivity and enhance streamlining of the construction process through improved communication and collaboration with consultants and contractors involved in the construction life cycle.

Licensing/Regulatory Information

Work in this area must be completed according to relevant legislative, industry and organisational requirements, including occupational health and safety (OHS) policies and procedures.

Different states and territories may have regulatory mechanisms that apply to this unit. Users are advised to check for regulatory limitations.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Develop BIM project documentation	1.1	BIM project processes and schedules are planned and finalised in consultation with relevant project stakeholders.
		1.2	Procedures to provide accurate and reliable exchange of project models are developed according to ***organisational and project requirements***.
		1.3	Project documentation is generated according to organisational and project requirements using outputs of appropriate functions of design technology tools.
2	Develop a BIM project	2.1	Information **relating to *small-scale building design projects*** is analysed and applied to plans for BIM development.
		2.2	3-D models are created according to organisational and project requirements and software operation instructions using appropriate ***design technology tools***.
		2.3	***Building design data*** is embedded in project model ***objects*** to allow collaboration, integration and generation of required project documentation.
		2.4	BIM is checked and tested according to organisational and project requirements to confirm accuracy and functionality.
3	Exchange and collaborate on project models	3.1	Transfer of BIM files is tested according to organisational procedures to ensure integrity of format and data is retained on receipt.

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3.2 BIMs are provided to other consultants or contractors for addition of specialist data according to project requirements and data sharing protocols.

3.3 BIMs or BIM data provided by other consultants or contractors are imported or linked and checked for integrity according to project and organisational requirements.

3.4 BIMs are amended and manipulated live in collaboration with other contractors and consultants operating within the same model.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- administration and management skills to:
  - develop process map, task list and schedule for BIM implementation
  - implement and manage standards
  - manage projects and documents
  - manage time, including planning and prioritising work
- analytical and problem-solving skills to:
  - develop innovative ideas and designs
  - select cost-effective products and materials that contribute to sustainable development
  - work out optimum compliant and cost-effective design solutions
- interpersonal skills to interact with clients and other stakeholders, including planning and regulatory personnel and technical experts
- language, literacy and numeracy skills to:
  - communicate with clients and contacts
  - estimate costs
  - interpret and apply complex information, including legislation, regulations, and codes and standards
  - present design options to clients
- technical skills to:
  - produce accurate design documentation and hand drawings
  - apply compliance requirements, including drawing standards
  - design from a brief
  - plan and carry out design, including visualising spaces, form, shapes and light

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- technology skills to use information technology, BIM technologies and relevant software

Required knowledge

- architectural styles and terminology
- basic principles of structural engineering
- building designers' duty of care to ensure quality and safety of designs
- benefits and challenges of adopting a BIM approach to design production and documentation
- contextual and site constraints
- conventional and sustainable construction materials and methods, including their application, behaviour, characteristics, performance and interactions with other materials
- design development and approval processes, and implications of changes to design at each stage
- design drawing and representation methods
- design technology's built-in tools and networking tools required to maintain two or more disciplines in a single project model within a local area network (LAN)
- tools required to manage a project with two or more disciplines across a wide area network (WAN)
- hazards of site, materials, construction practices and building use over life cycle
- key features of building life cycles
- legislation, codes and standards relevant to sustainable design requirements for small-scale building design projects
- organisational scope of business, service levels and fees
- planning processes and requirements
- pricing of resources
- principles of integrated project delivery
- principles of sustainable design
- project management strategies
- scientific and social principles of human interactions with the built environment
- tools required to create a realistic BIM implementation plan that responds to specific staff, financial and schedule constraints

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence	A person should demonstrate the ability to: • produce interactive BIM projects for a range of small-scale

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required to demonstrate competency in this unit	building design projects in consultation with project team
	• collaborate on BIM projects with a range of stakeholders, including:
	  • integration of imported data
	  • live interoperations.

Context of and specific resources for assessment	Assessment of this unit:
	• must be in the context of the work environment
	• may be conducted in an off-site context, provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills
	• must meet relevant compliance requirements.
	Resource implications for assessment include:
	• access to:
	  • suitable assessment venue and equipment
	  • suitable simulated or real opportunities and resources to demonstrate competence
	• assessment instruments.

Method of assessment	Assessment for this unit must verify the practical application of the required skills and knowledge, using one or more of the following methods: • written and/or oral assessment of the candidates required knowledge for the unit • observed, documented and/or firsthand testimonial evidence of the candidates • implementation of appropriate procedures and techniques for the safe, effective and efficient achievement of the required outcomes • identification of the relevant information and scope of the work required to meet the required outcomes • identification of viable options and the selection of options that best meet the required outcomes • consistently achieving the required outcomes.
Guidance information for assessment	This unit could be assessed on its own or in combination with other units relevant to the job function. Where applicable, physical resources should include equipment modified for people with disabilities. Access must be provided to appropriate learning and/or assessment support when required. Assessment processes and techniques must be culturally

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	appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Organisational and project requirements may include:	• communications protocols • file exchange formats • reporting requirements • schedule.

Small-scale building design projects:	• include buildings covered by the BCA, except construction Type A buildings
	• may be residential projects, such as:
	  • additions and renovations
	  • heritage restoration
	  • new buildings
	• may be commercial or industrial projects, such as:
	  • factories
	  • motels
	  • offices
	  • restaurants
	  • retail and service outlets
	  • warehouses.

Design technology tools may include:	• proprietary 3, 4 and 5-D modelling software, such as:
	  • Autodesk Architectural Desktop
	  • Autodesk Revit
	  • Bentley Architecture
	  • Graphisoft ArchiCAD
	  • VectorWorks ARCHITECT.

Building design data may include:	• details of compliance requirements, including those specified in:
	  • Australian standards
	  • client requirements
	  • design specifications

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	• legislation and regulations • manufacturer specifications • dimensions • labour costs • material costs • material properties, such as: • acoustic values • energy efficiency • fire resistance • R-value and U-value • strength.
Objects may include:	• customised imports • imports from online object libraries • new objects created by the designer.

Unit Sector(s)

Building design

Custom Content Section

Not applicable.

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CPPFES2043A Prevent ozone depleting substance and synthetic greenhouse gas emissions

Modification History

Revised unit

Unit updated and equivalent to PRMPFES43A Prevent ozone depleting substance and synthetic greenhouse gas emissions

Unit Descriptor

This unit of competency specifies the outcomes required to identify and describe agreements, protocols, legislation, regulations, codes of practice and handling licences developed to reduce ozone layer depletion and global warming.

Application of the Unit

This unit of competency supports individuals responsible for:

- complying with legal, industry, regulatory and licensing requirements relating to ozone depleting substance (ODS) and synthetic greenhouse gas (SGG) extinguishing agents used in fire protection
- considering the impact of work practices in the fire protection industry on ozone layer depletion and global warming
- proposing changes to reduce the risk of accidental emmissions that contribute to ozone layer depletion and global warming.

Licensing/Regulatory Information

The unit supports one or more fire protection industry extinguishing agent handling licences (EAHL) prescribed under the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989.

Different states and territories may have regulatory mechanisms that apply to this unit. Candidates are advised to check for regulatory limitations.

Pre-Requisites

Not applicable.

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Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Apply rules and regulations to the use of ODS and SGG extinguishing agents.	1.1	Requirements of relevant ***rules and regulations*** are ***confirmed*** and applied to ***work procedures*** to prevent ODS and SGG emissions.
		1.2	***Compliance requirements are checked*** and ***action*** is taken according to organisational policies and procedures, ODS and SGG policies and procedures, and best practice requirements.
2	Identify ODS and SGG handling licences, trading authorisations and usage permits.	2.1	Types of ODS and SGG ***extinguishing agent handling licences***, licence requirements and ***entitlements of licensees*** are identified.
		2.2	Extinguishant trading authorisations are identified.
		2.3	Halon special permit usage requirements are identified.
3	Apply an understanding of ozone layer depletion and global warming.	3.1	Role and functions of ***ozone layer*** are identified and explained.
		3.2	Factors involved with, and effects of, ***global warming*** are identified and described.
		3.3	***ODS and SGG extinguishing agents*** used in fire protection industry are identified by type.
		3.4	***Effect of ozone depletion and global warming*** on

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human health, environment and fire protection industry work practices is described.

3.5 Relevant fire protection industry ODS and SGG work practices are identified.

3.6 Improvements to ODS and SGG work practices are identified and proposed to reduce the risk of accidental emmissions.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- language, literacy and numeracy skills to:
  - communicate with others clearly and concisely, verbally and in writing
  - read and comply with work industry regulations and codes of practice
  - interpret information
- initiative and enterprise skills to:
  - seek advice on license requirements
  - apply understanding of ozone layer depletion and global warming to change and improve fire protection industry work practices
  - identify and act upon learning opportunities
- technology skills to use technology to access information

Required knowledge

- effect of ozone layer
- actions to take where a breach of ODS and SGG policies and procedures occurs
- effect of:
  - ODS and SGG emissions on ozone depletion and global warming
  - ozone depletion and global warming on environment and human health
- factors involved in global warming
- implications of not applying ODS and SGG legislative requirements to the workplace
- key features of:
  - legislation, regulations and standards applicable to ozone protection in the fire protection industry
  - fire protection industry codes of practice
- ODS and SGG substances used in the fire protection industry
- ODS and SGG EAHL features and requirements, authorisations and permit requirements

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- relevant federal, state or territory legislation that affects organisational operations

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	This unit of competency could be assessed by oral or written questioning covering: • underpinning knowledge of the effects of ODS and SGG emissions and current arrangements • workplace examples of action taken to reduce risk of emissions and responses to potential or actual breaches of legislation.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	A person who demonstrates competency in this unit must be able to provide evidence of the required skills and knowledge specified in this unit.
	In particular the person should demonstrate the ability to:
	• apply understanding of ozone layer depletion and global warming for:
	  • discussing the effect of ODS and SGG emissions on the ozone layer and global warming
	  • describing the impact of ozone depletion and global warming on human health and the environment
	  • assessing impact on fire protection industry work practices
	  • proposing changes to fire protection industry work practices to meet ODS and SGG legal requirements
	  • taking action to respond to potential and actual breaches of ODS and SGG regulations
	• locate, interpret and explain:
	  • ODS and SGG legal requirements for handling extinguishing agents in the fire protection industry
	  • EAHL types, associated responsibilities, usage permits and trading authorisations
	  • agreements, protocols, regulatory requirements, fire protection industry code of practice, and Australian standards relevant to EAHL.

Context of and specific resources for assessment	Assessment of essential underpinning knowledge may be conducted in an off-site context. It is to comply with relevant regulatory or Australian standards' requirements.

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	Resource implications for assessment include: • assessment documentation • necessary legislation and regulatory documents, manuals, textbooks and other relevant documentation • training and assessment record books.
Method of assessment	Assessment methods must: • satisfy the endorsed Assessment Guidelines of the Property Services Training Package • include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application • reinforce the integration of employability skills with workplace tasks and job roles • confirm that competency is verified and able to be transferred to other circumstances and environments.
Guidance information for assessment	Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support. Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed. This unit could be assessed on its own or in combination with other units relevant to the job function.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Rules and regulations may include:	• dangerous goods regulations • environmental regulations • fire protection industry codes of practice • licensing arrangements, such as EAHL • manufacturers' system manuals • ODS and SGG legislation, codes and regulations, including

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	penalties and policing
	• OHS legislation, regulations and codes
	• other relevant legislation relating to fire protection equipment, including:
	  • international shipping codes
	  • marine codes for different Australian States
	  • requirements of Australian petroleum industry
	• relevant agreements and protocols
	• relevant Australian standards, such as:
	  • AS 1851 Maintenance of fire protection systems and equipment
	  • note: Australian standards are frequently revised and users must always check for currency and amendments
	• relevant federal, state and territory Acts, regulations and codes.

Requirements may be ***confirmed*** with:	• colleagues • managers • supervisors • team leaders.
Work procedures may include:	• assignment instructions • equipment manufacturers' requirements • instructions from colleagues, supervisor or manager • personal protective equipment requirements • reporting and documentation requirements • specific customer requirements.
Checking compliance requirements may include ensuring that:	• persons trading in ODS and SGG hold the appropriate trading authorisation or ODS and SGG permit • scope of work to be undertaken is covered by the appropriate license.
Action may include:	• advising customer • documenting non-compliance • making equipment safe • reporting, as required.
Types of ***extinguishing agent handling licence*** include:	• control systems installation, commissioning and decommissioning • fixed system installation and decommissioning • fixed system testing and maintenance • portable fire extinguisher maintenance • recovery, reclamation, fill and recycling • warehouse maintenance.
Entitlements of licensees include:	• portable fire extinguisher maintenance licence entitles holder: • to charge and recharge a portable fire extinguisher with

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	non-ODS and SGG agent • note: a reclaim and refill licence is required to charge or recharge a portable extinguisher with ODS or SGG • repair the extinguisher valve • fixed system installation and decommissioning licence entitles holder to: • install and decommission a gaseous fire-extinguishing system (fire protection equipment) including to: • install and disconnect actuation devices (mechanisms) to and from container valves • install and disconnect gaseous agent containers • install and disconnect interconnections to other gaseous system containers • install and disconnect ancillary equipment connections to manifold and pipework • attach and remove transport equipment, such as valve outlet and actuator port caps, plugs and locking devices installed to prevent accidental discharge • commission actuation control devices set to operate and engage safety devices as needed and decommission these devices • fixed system testing and maintenance licence entitles holder to: • test and maintain a gaseous fire-extinguishing system (fire protection equipment), including to: • test actuation release systems • disconnect and reconnect actuation devices (mechanisms) • disconnect and reconnect interconnections to other gaseous system containers • disconnect and reconnect ancillary equipment connections from containers to manifold and pipework • test actuation devices (mechanisms) • perform tests and maintenance on any fire detection and alarm system, including any remote operation panel and actuation and control system that interfaces with or forms part of a gaseous fire-extinguishing system • perform tests and maintenance on gaseous agent containers and ancillary equipment connections from containers to manifold and pipework • recovery, reclamation, fill and recycling licence entitles holder to: • recover, reclaim, fill and recycle an extinguishing agent into and from a fire extinguisher and gaseous fire-extinguishing system container, from and to a bulk agent container

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	• warehouse maintenance licence entitles holder to:
	  • monitor for leakage stocks of extinguishing agent bulk agent containers in a warehouse and, as needed, to transfer extinguishing agent from a leaking storage container
	• control systems installation, commissioning and decommissioning licence entitles holder to:
	  • install, commission and decommission a fire detection and alarm system, including any remote operation panel and actuation and control system that interfaces with or forms part of a gaseous fire-extinguishing system.

Ozone layer facts include:	• composed of ozone (O3), which is a form of oxygen in which the oxygen molecule contains three atoms of oxygen instead of the usual two • ozone forms less than 0.4 parts per million of the atmosphere • about 90% of ozone is in upper part of atmosphere (stratosphere) • most ozone is in the layer from 20 to 25 km above the earth's surface.
Global warming involves:	• carbon dioxide found in small quantities (about 350 parts per million) in the atmosphere • carbon dioxide trapping infra red (heat) radiation and warming the atmosphere – the greenhouse effect.

ODS and SGG extinguishing agents may include:
 	
Note list format:
product name (other names) use
 	
Check the latest amendments to the Ozone Protection and Synthetic Greenhouse Gas Management Act for the current list of ODS and SGG extinguishing agents.
	• ODS and SGG extinguishing agents **commonly** used in Australia:
	  • FM200 (FE-227 Heptafluoropropane, HFC-227ea) used as a total flooding extinguishing agent and as a replacement for Halon 1301
	  • Halon 1211 (BCF, Halon 1211 BCF, Bromochlorodifluoromethane) used as a streaming agent – requires a special permit in Australia
	  • Halon 1301 (BTM, Halon 1301 BTM, Bromotrifluoromethane) used as a total flooding agent – requires a special permit in Australia
	  • NAF-P-III (HCFC Blend C) used as a streaming agent
	  • NAF-P-IV (HCFC Blend E) used as a streaming agent
	  • NAF-S-III (HCFC Blend A) used as a total flooding agent
	  • SF6 (Sulfurhexafluoride) used as an inerting agent in sealed high voltage switchgear
	• ODS and SGG extinguishing agents **not commonly** used in Australia:
	  • Blitz III (HCFC Blend D) used in flooding systems
	  • CFC-11 (Trichlorofluoromethane) may be found as a propellant in some powder fire extinguishers (this product is banned in Australia but may be found on incoming foreign

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	vessels) • FC-2-1-8 (CEA-308) used in flooding systems • FC-3-1-10 (CEA-410) used in flooding systems • FC-5-1-14 (CEA-614) used as a streaming agent • FE-13 (Trifluoromethane, HFC-23) used as a total flooding agent • FE-241 (Chlorotetrafluoroethane, HCFC-124) used as a total flooding agent for non-occupied spaces and as a streaming agent • FE-25 (Pentafluoroethane, HFC-125) used in inerting and explosion suppression applications • FE-36 (Hexafluoropropane, HFC-236fa) used in portable fire extinguishers – is a replacement for Halon 1211 and Halon 1301 • FM100 (HBFC-22B1) used in portable fire extinguishers • Halon 2402 (Dibromotetrafluoroethane) limited use in military systems – requires a special permit in Australia • Halotron I (HCFC Blend B or HCFC-123) used as a total flooding agent and streaming agent • Halotron II (blend of HFC-143a and HFC-125) used as a total flooding agent and as a replacement for Halon 1301 • HCFC-22 (Chlorodifluoromethane) used as a propellant in some powder fire extinguishers (this product is banned in Australia but may be found on incoming foreign vessels) • HFC-134a (Unsymmetric tetrafluoroethane) used as a propellant in some powder fire extinguishers.

Effect of ozone depletion and global warming on human health and the environment may include:	• changes to work practices, including those in the fire protection industry
	• constraints on:
	  • aquatic ecosystems
	  • human immune system
	• increased:
	  • incidence of photochemical smog
	  • risk of:
	  • cataracts
	  • skin cancer
	  • inhibited growth of plants
	  • reduced production of agriculture.

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Unit Sector(s)

Fire protection equipment

Custom Content Section

Not applicable.

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HLTAID001 Provide cardiopulmonary resuscitation

Modification History

Release	Notes
Release 5	Updated: • assessor requirements statement • foundation skills lead in statement • licensing statement • modification history to reflect 2012 standards Equivalent outcome.
Release 4	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 3	Updated mapping information. Equivalent outcome.
Release 2	Updated mapping information. Equivalent outcome.
Release 1	This version was released in *HLT Health Training Package release 1.0* and meets the requirements of the 2012 Standards for Training Packages. Significant changes to elements and performance criteria. Revised evidence requirements, including volume and frequency of assessment.

Application

This unit describes the skills and knowledge required to perform cardiopulmonary resuscitation (CPR) in line with the Australian Resuscitation Council (ARC) Guidelines.

This unit applies to all workers who may be required to provide CPR, in a range of situations, including community and workplace settings.

Specific licensing /regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements define the essential outcomes.	*Performance criteria specify the level of performance needed to demonstrate achievement of the element.*
1. Respond to an emergency situation	1.1 Recognise an emergency situation 1.2 Identify, assess and minimise immediate hazards to health and safety of self and others 1.3 Assess the casualty and recognise the need for CPR 1.4 Seek assistance from emergency response services
2. Perform CPR procedures	2.1 Perform cardiopulmonary resuscitation in accordance with ARC guidelines 2.2 Display respectful behaviour towards casualty 2.3 Operate automated external defibrillator (AED) according to manufacturer's instructions
3. Communicate details of the incident	3.1 Accurately convey incident details to emergency response services 3.2 Report details of incident to workplace supervisor as appropriate 3.3 Maintain confidentiality of records and information in line with statutory and/or organisational policies

Foundation Skills

The Foundation Skills describe those required skills (language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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Assessment Requirements for HLTAID001 Provide cardiopulmonary resuscitation

Modification History

Release	Notes
Release 5	Updated: • assessor requirements statement • foundation skills lead in statement • licensing statement • modification history to reflect 2012 standards Equivalent outcome.
Release 4	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 3	Updated mapping information. Equivalent outcome.
Release 2	Updated mapping information. Equivalent outcome.
Release 1	This version was released in *HLT Health Training Package release 1.0* and meets the requirements of the 2012 Standards for Training Packages. Significant changes to elements and performance criteria. Revised evidence requirements, including volume and frequency of assessment.

Performance Evidence

The candidate must show evidence of the ability to complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the job role.

There must be evidence that the candidate has completed the following tasks in line with state/territory regulations, first aid codes of practice, Australian Resuscitation Council (ARC) guidelines and workplace procedures:

- Followed DRSABCD in line with ARC guidelines, including:
  - performed at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor

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  - performed at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface
  - responded appropriately in the event of regurgitation or vomiting
  - managed the unconscious breathing casualty
  - followed single rescue procedure, including the demonstration of a rotation of operators with minimal interruptions to compressions
  - followed the prompts of an automated external defibrillator (AED)
- Responded to at least one simulated first aid scenario contextualised to the candidate's workplace/community setting, including:
  - demonstrated safe manual handling techniques
  - provided an accurate verbal or written report of the incident

Knowledge Evidence

The candidate must be able to demonstrate essential knowledge required to effectively complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the work role. This includes knowledge of:

- State/Territory regulations, first aid codes of practice and workplace procedures including:
  - ARC Guidelines relevant to the provision of CPR
  - safe work practices to minimise risks and potential hazards
  - infection control principles and procedures, including use of standard precautions
  - requirements for currency of skill and knowledge
- Legal, workplace and community considerations, including:
  - awareness of potential need for stress-management techniques and available support following an emergency situation
  - duty of care requirements
  - respectful behaviour towards a casualty
  - own skills and limitations
  - consent
  - privacy and confidentiality requirements
  - importance of debriefing
- Considerations when providing CPR, including:
  - airway obstruction due to body position
  - appropriate duration and cessation of CPR
  - appropriate use of an AED
  - chain of survival
  - standard precautions
- Basic anatomy and physiology relating to:
  - how to recognise a person is not breathing normally
  - chest

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- response/consciousness
- upper airway and effect of positional change

Assessment Conditions

Skills must be demonstrated working individually in an environment that provides realistic in-depth, industry-validated scenarios and simulations to assess candidates' skills and knowledge.

Assessment resources must include:

- adult and infant resuscitation manikins in line with ARC Guidelines for the purpose of assessment of CPR procedures
- AED training device
- workplace injury, trauma and/or illness record, or other appropriate workplace incident report form

Simulated assessment environments must simulate the real-life working environment where these skills and knowledge would be performed, with all the relevant equipment and resources of that working environment.

Assessor Requirements

Assessors must satisfy the Standards for Registered Training Organisations (RTOs) 2015/AQTF mandatory competency requirements for assessors.

In addition hold current first aid certificate HLTAID003 or higher.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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HLTAID003 Provide first aid

Modification History

Release	Comments
Release 6	Updated: • assessor requirements statement • foundation skills lead in statement • licensing statement • modification history to reflect 2012 standards Equivalent outcome.
Release 5	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 4	Updated mapping information. Equivalent outcome.
Release 3	Updated mapping information.
Release 2	Minor corrections to formatting to improve readability. Equivalent competency outcome.
Release 1	This version was released in *HLT Health Training Package release 1.0* and meets the requirements of the 2012 Standards for Training Packages. Significant changes to elements and performance criteria, changes to scope of unit. New evidence requirements for assessment. Removal of prerequisite unit.

Application

This unit describes the skills and knowledge required to provide a first aid response to a casualty. The unit applies to all workers who may be required to provide a first aid response in a range of situations, including community and workplace settings.

Specific licensing /regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements define the essential outcomes.	*Performance criteria specify the level of performance needed to demonstrate achievement of the element.*
1. Respond to an emergency situation	1.1 Recognise an emergency situation 1.2 Identify, assess and manage immediate hazards to health and safety of self and others 1.3 Assess the casualty and recognise the need for first aid response 1.4 Assess the situation and seek assistance from emergency response services
2. Apply appropriate first aid procedures	2.1 Perform cardiopulmonary resuscitation (CPR) in accordance with Australian Resuscitation Council (ARC) guidelines 2.2 Provide first aid in accordance with established first aid principles 2.3 Display respectful behaviour towards casualty 2.4 Obtain consent from casualty where possible 2.5 Use available resources and equipment to make the casualty as comfortable as possible 2.6 Operate first aid equipment according to manufacturer’s instructions 2.7 Monitor the casualty’s condition and respond in accordance with first aid principles
3. Communicate details of the incident	3.1 Accurately convey incident details to emergency response services 3.2 Report details of incident to workplace supervisor as appropriate 3.3 Maintain confidentiality of records and information in line with statutory and/or organisational policies

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ELEMENT	PERFORMANCE CRITERIA
Elements define the essential outcomes.	*Performance criteria specify the level of performance needed to demonstrate achievement of the element.*
4. Evaluate the incident and own performance	4.1 Recognise the possible psychological impacts on self and other rescuers involved in critical incidents 4.2 Participate in debriefing to address individual needs

Foundation Skills

The Foundation Skills describe those required skills (language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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Assessment Requirements for HLTAID003 Provide first aid

Modification History

Release	Comments
Release 6	Updated: • assessor requirements statement • foundation skills lead in statement • licensing statement • modification history to reflect 2012 standards Equivalent outcome.
Release 5	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 4	Updated mapping information. Equivalent outcome.
Release 3	Updated mapping information.
Release 2	Minor corrections to formatting to improve readability. Equivalent competency outcome.
Release 1	This version was released in *HLT Health Training Package release 1.0* and meets the requirements of the 2012 Standards for Training Packages. Significant changes to elements and performance criteria, changes to scope of unit. New evidence requirements for assessment. Removal of prerequisite unit.

Performance Evidence

e candidate must show evidence of the ability to complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the job role.

There must be evidence that the candidate has completed the following tasks in line with state/territory regulations, first aid codes of practice, Australian Resuscitation Council (ARC) guidelines and workplace procedures:

- Followed DRSABCD in line with ARC guidelines, including:

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  - performed at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
  - performed at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface
  - responded appropriately in the event of regurgitation or vomiting
  - managed the unconscious breathing casualty
  - followed single rescue procedure, including the demonstration of a rotation of operators with minimal interruptions to compressions
  - followed the prompts of an Automated External Defibrillator (AED)
- Responded to at least two simulated first aid scenarios contextualised to the candidate's workplace/community setting, including:
  - conducted a visual and verbal assessment of the casualty
  - demonstrated safe manual handling techniques
  - post-incident debrief and evaluation
  - provided an accurate verbal or written report of the incident
- Applied first aid procedures for the following:
  - allergic reaction
  - anaphylaxis
  - bleeding control
  - choking and airway obstruction
  - envenomation, using pressure immobilisation
  - fractures, sprains and strains, using arm slings, roller bandages or other appropriate immobilisation techniques
  - respiratory distress, including asthma
  - shock

Knowledge Evidence

The candidate must be able to demonstrate essential knowledge required to effectively complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the work role. This includes knowledge of:

- State/Territory regulations, first aid codes of practice and workplace procedures including:
  - ARC Guidelines relevant to provision of CPR and first aid
  - safe work practices to minimise risks and potential hazards
  - infection control principles and procedures, including use of standard precautions
  - requirements for currency of skill and knowledge
- legal, workplace and community considerations including:
  - awareness of potential need for stress-management techniques and available support following an emergency situation
  - duty of care requirements

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  - respectful behaviour towards a casualty
  - own skills and limitations
  - consent
  - privacy and confidentiality requirements
  - importance of debriefing
- considerations when providing first aid including:
  - airway obstruction due to body position
  - appropriate duration and cessation of CPR
  - appropriate use of an AED
  - chain of survival
  - standard precautions
  - how to conduct a visual and verbal assessment of the casualty
- principles and procedures for first aid management of the following scenarios:
  - abdominal injuries
  - allergic reaction
  - anaphylaxis
  - basic care of a wound
  - bleeding control
  - burns
  - cardiac conditions, including chest pain
  - choking and airway obstruction
  - crush injuries
  - diabetes
  - dislocations
  - drowning
  - envenomation
  - environmental impact, including hypothermia, hyperthermia, dehydration and heat stroke
  - eye and ear injuries
  - fractures
  - febrile convulsions
  - head, neck and spinal injuries
  - minor skin injuries
  - needle stick injuries
  - poisoning and toxic substances
  - respiratory distress, including asthma
  - seizures, including epilepsy
  - shock
  - soft tissue injuries, including strains and, sprains
  - stroke

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  - unconsciousness
- basic anatomy and physiology relating to:
  - how to recognise a person is not breathing normally
  - chest
  - response/consciousness
  - upper airway and effect of positional change
  - considerations in provision of first aid for specified conditions

Assessment Conditions

Skills must be demonstrated working individually in an environment that provides realistic in-depth, industry-validated scenarios and simulations to assess candidates' skills and knowledge.

Assessment resources must include:

- adult and infant resuscitation manikins in line with ARC Guidelines for the purpose of assessment of CPR procedures
- adrenaline auto-injector training device
- AED training device
- placebo bronchodilator and spacer device
- roller bandages
- triangular bandages
- workplace First Aid kit
- workplace injury, trauma and/or illness record, or other appropriate workplace incident report form for written reports
- wound dressings

Simulated assessment environments must simulate the real-life working environment where these skills and knowledge would be performed, with all the relevant equipment and resources of that working environment.

Assessor requirements

Assessors must satisfy the Standards for Registered Training Organisations (RTOs) 2015/AQTF mandatory competency requirements for assessors.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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HLTAID009 Provide cardiopulmonary resuscitation

Modification History

Not applicable.

Application

This unit describes the skills and knowledge required to perform cardiopulmonary resuscitation (CPR) in line with the Australian Resuscitation Council (ARC) guidelines.

This unit applies to all persons who may be required to provide CPR, in a range of situations, including community and workplace settings.

Specific licensing/regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Respond to an emergency situation.	1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR). 1.4. Seek assistance from emergency services.
2. Perform CPR procedures.	2.1. Perform CPR in accordance with the ARC guidelines. 2.2. Display respectful behaviour towards casualty. 2.3. Operate an automated external defibrillator (AED) according to manufacturers' instructions.
3. Communicate details of the incident.	3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Maintain privacy and confidentiality of information in line with statutory or organisational policies.

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4. Review the incident.	4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.

Foundation Skills

The Foundation Skills describe those required skills (language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and not equivalent to HLTAID001 Perform cardiopulmonary resuscitation

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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Assessment Requirements for HLTAID009 Provide cardiopulmonary resuscitation

Modification History

Not applicable.

Performance Evidence

Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the workplace or community setting.

There must be evidence that the candidate has completed the following tasks in line with State/Territory regulations, first aid codes of practice, first aid guidelines determined by the Australian Resuscitation Council (ARC) and other Australian national peak clinical bodies and workplace or site procedures:

- managed, in line with ARC guidelines, the unconscious, breathing casualty including appropriate positioning to reduce the risk of airway compromise
- managed, in line with ARC guidelines, the unconscious, non-breathing adult, including:
  - performing at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
  - following the prompts of an automated external defibrillator (AED) to deliver at least one shock
  - demonstrating a rotation of single rescuer operators with minimal interruptions to compressions
  - responding appropriately in the event of regurgitation or vomiting
  - handing over to emergency services
  - providing an accurate verbal report of the incident
  - reviewing the incident
- managed, in line with ARC guidelines, the unconscious, non-breathing infant, including:
  - performing at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface.

Knowledge Evidence

Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit:

- guidelines and procedures including:
  - relevant ARC guidelines to managing the unconscious breathing and non-breathing casualty and provision of CPR
  - potential incident hazards and risk minimisation processes when providing first aid

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  - infection control procedures, including use of standard precautions and resuscitation barrier devices
  - requirements for currency of skill and knowledge
  - first aid codes of practice
  - appropriate workplace or site procedures relevant to the provision of first aid
- legal, workplace and community considerations, including:
  - duty of care requirements
  - own skills and limitations
  - consent and how it relates to the conscious and unconscious casualty
  - privacy and confidentiality requirements
  - awareness of potential need for stress management techniques and available support for rescuers
- considerations when providing CPR, including:
  - upper airway and effect of positional change
  - appropriate duration and cessation of CPR
  - appropriate use of an AED
  - safety and maintenance procedures for an AED
  - chain of survival
  - how to access emergency services
- techniques for providing CPR to adults, children and infants including:
  - how to recognise that a casualty is unconscious and not breathing normally
  - rate, ratio and depth of compressions and ventilations
  - correct hand positioning for compressions
  - basic anatomy, physiology and the differences between adults, children and infants relating to CPR.

Assessment Conditions

Each candidate to demonstrate skills in an environment that provides realistic in-depth, scenarios and simulations to assess candidates' skills and knowledge.

Due to the nature of this type of training, it is acceptable for the performance evidence to be collected in a simulated environment.

Compression and ventilation skills must be demonstrated on resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures.

Assessment must ensure access to:

- adult and infant resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures
- AED training devices
- personal protective equipment (PPE).

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Simulated assessment environments must simulate real-life situations where these skills and knowledge would be performed, with all the relevant equipment and resources of that workplace or community environment.

Assessors must satisfy the Standards for Registered Training Organisations' requirements for assessors and must hold this unit or demonstrate equivalent skills and knowledge to that contained within this unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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HLTAID011 Provide First Aid

Modification History

Not applicable.

Application

This unit describes the skills and knowledge required to provide a first aid response to a casualty in line with first aid guidelines determined by the Australian Resuscitation Council (ARC) and other Australian national peak clinical bodies.

The unit applies to all persons who may be required to provide a first aid response in a range of situations, including community and workplace settings.

Specific licensing/regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Respond to an emergency situation.	1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for first aid response. 1.4. Seek assistance from emergency services.
2. Apply appropriate first aid procedures.	2.1. Perform cardiopulmonary resuscitation (CPR) in accordance ARC guidelines. 2.2. Provide first aid in accordance with established first aid principles. 2.3. Display respectful behaviour towards casualty. 2.4. Obtain consent from casualty where possible. 2.5. Use available resources and equipment to make the casualty as comfortable as possible. 2.6. Operate first aid equipment according to manufacturers' instructions. 2.7. Monitor the casualty's condition and respond in accordance with first aid principles.

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3. Communicate details of the incident.	3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Complete applicable workplace or site documentation, including incident report form. 3.4. Maintain privacy and confidentiality of information in line with statutory or organisational policies.
4. Review the incident.	4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.

Foundation Skills

The Foundation Skills describe those required skills (language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and not equivalent to HLTAID003 Provide first aid

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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Assessment Requirements for HLTAID011 Provide First Aid

Modification History

Not applicable.

Performance Evidence

Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the workplace or community setting.

There must be evidence that the candidate has completed the following tasks in line with State/Territory regulations, first aid codes of practice, first aid guidelines determined by the Australian Resuscitation Council (ARC) and other Australian national peak clinical bodies and workplace or site procedures:

- managed, in line with ARC guidelines, the unconscious, breathing casualty including appropriate positioning to reduce the risk of airway compromise
- managed, in line with ARC guidelines, the unconscious, non-breathing adult, including:
  - performing at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
  - following the prompts of an automated external defibrillator (AED) to deliver at least one shock
  - demonstrating a rotation of single rescuer operators with minimal interruptions to compressions
  - responding appropriately in the event of regurgitation or vomiting
- managed, in line with ARC guidelines, the unconscious, non-breathing infant, including:
  - performing at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface
- managed casualties, with the following:
  - anaphylaxis
  - asthma
  - non-life-threatening bleeding
  - choking
  - envenomation, using pressure immobilisation
  - fractures, dislocations, sprains and strains, using appropriate immobilisation techniques
  - minor wound cleaning and dressing
  - nosebleed
  - shock

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- responded to at least one simulated first aid incident contextualised to the candidate's workplace or community setting, where the candidate has no knowledge of the casualty's condition prior to starting treatment, including:
  - identifying the casualty's illness or injury through history, signs and symptoms
  - using personal protective equipment (PPE) as required
  - providing appropriate first aid treatment
  - conveying incident details to emergency services or advising casualty on any required post incident action
  - providing an accurate verbal and written report of the incident
  - reviewing the incident.

Knowledge Evidence

Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit:

- guidelines and procedures including:
  - ARC guidelines relevant to the provision of first aid
  - first aid guidelines from Australian national peak clinical bodies
  - potential incident hazards and risk minimisation processes when providing first aid
  - infection control procedures, including use of standard precautions and resuscitation barrier devices
  - requirements for currency of skill and knowledge
  - first aid codes of practice
  - appropriate workplace or site procedures relevant to the provision of first aid
  - contents of first aid kits
- legal, workplace and community considerations including:
  - duty of care requirements
  - own skills and limitations
  - consent and how it relates to the conscious and unconscious casualty
  - privacy and confidentiality requirements
  - awareness of potential need for stress management techniques and available support for rescuers
- considerations when providing CPR, including:
  - upper airway and effect of positional change
  - appropriate duration and cessation of CPR
  - appropriate use of an AED
  - safety and maintenance procedures for an AED
  - chain of survival
  - how to access emergency services
- techniques for providing CPR to adults, children and infants including:
  - how to recognise that a casualty is unconscious and not breathing normally

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  - rate, ratio and depth of compressions and ventilations
  - correct hand positioning for compressions
  - basic anatomy, physiology and the differences between adults, children and infants relating to CPR
- signs, symptoms and management of the following conditions and injuries:
  - allergic reaction
  - anaphylaxis
  - asthma
  - non-life-threatening and life-threatening bleeding
  - burns
  - cardiac conditions, including chest pain
  - choking
  - diabetes
  - drowning
  - envenomation - all current treatments
  - eye injuries
  - fractures, dislocations, strains and sprains
  - head, neck and spinal injuries
  - hypothermia
  - hyperthermia
  - minor wounds
  - nose-bleed
  - poisoning
  - seizures
  - shock
  - sharps injuries
  - stroke.

Assessment Conditions

Each candidate to demonstrate skills in an environment that provides realistic in-depth, scenarios and simulations to assess candidates' skills and knowledge.

Due to the nature of this type of training, it is acceptable for the performance evidence to be collected in a simulated environment.

Compression and ventilation skills must be demonstrated on resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures.

Assessment must ensure access to:

- adult and infant resuscitation manikins following ARC guidelines for the purpose of assessment of CPR procedures
- adrenaline auto-injector training device

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- AED training devices
- workplace first aid kit
- placebo bronchodilator and spacer device
- different types of wound dressings and bandages
- blankets and items to treat for shock
- personal protective equipment (PPE)
- workplace injury, trauma or illness record, or other applicable workplace or site incident report form.

Simulated assessment environments must simulate real-life situations where these skills and knowledge would be performed, with all the relevant equipment and resources of that workplace or community environment.

Assessors must satisfy the Standards for Registered Training Organisations' requirements for assessors and must hold this unit or demonstrate equivalent skills and knowledge to that contained within this unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ced1390f-48d9-4ab0-bd50-b015e5485705

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ICTICT203 Operate application software packages

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 1.0.

Application

This unit describes the skills and knowledge required to identify, select and operate three commercial software packages, including a word-processing and a spreadsheet application package.

It applies to individuals who utilise different software applications within a small to large office environment to produce diverse documents.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

General ICT

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Use appropriate workplace health and safety (WHS) office work practices	1.1 Use safe work practices to ensure ergonomic, work organisation, energy and resource conservation requirements are addressed 1.2 Use wrist rests and document holders where appropriate 1.3 Use monitor anti-glare and radiation reduction screens where appropriate
2. Use appropriate	2.1 Select word-processing software appropriate to perform

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ELEMENT	PERFORMANCE CRITERIA
word-processing software	activity 2.2 Identify document purpose, audience and presentation requirements, and clarify with personnel as required 2.3 Identify organisational requirements for text-based business documents, and design document structure and layout to ensure consistency of style and image 2.4 Match document requirements with software functions to provide efficient production of documents 2.5 Use technical functions, other data and formatting to finalise documents 2.6 Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications
3. Use appropriate spreadsheet software	3.1 Select spreadsheet software appropriate to perform activity 3.2 Identify document purpose, audience and presentation requirements, and clarify with personnel as required 3.3 Enter simple formulas and functions using cell referencing where required 3.4 Customise spreadsheet settings to meet requirements 3.5 Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications
4. Use a third application software package	4.1 Select software application package appropriate to perform activity 4.2 Identify purpose, audience and presentation requirements, and clarify with personnel as required 4.3 Use technical functions, other data and formatting to finalise documents 4.4 Ensure documents are named and stored in appropriate directories or folders and printed to required specifications

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

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Skill	Performance Criteria	Description
Reading	2.2-2.5, 3.2-3.4, 4.2, 4.3	• Recognises and interprets textual information to determine organisational standards and job requirements • Interprets and comprehends symbols, icons and text associated with applications software
Writing	2.3-2.6, 3.3- 3.5, 4.3, 4.4	• Enters both written and verbally received information and data into a format suitable for the software application • Selects vocabulary, syntax, terminology, labelling and naming conventions suitable for the program
Oral Communication	2.2, 2.3, 3.2, 4.2	• Uses simple, relevant language, effective questioning, and active listening techniques to clarify work requirements
Numeracy	3.2-3.4	• Adds, subtracts, multiplies and divides whole numbers and decimals, identifying and selecting the correct formulas and functions to use • Applies the order of operations in calculations
Navigate the world of work	1.1	• Takes some personal responsibility for adherence to legal and regulatory requirements
Get the work done	1.2, 1.3, 2.1-2.6, 3.1-3.5, 4.1-4.4	• Follows routine procedures for using digital technology to enter, store and retrieve information directly relevant to role • Understands purposes, specific functions and key features of common digital systems and tools, and operates them effectively to complete routine tasks, adapting some functions to improve personal efficiency • Plans routine tasks with familiar goals and outcomes, taking some limited responsibility for decisions regarding sequencing

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTICT203 Operate application software packages	ICAICT203A Operate application software packages	Updated to meet Standards for Training Packages	Equivalent unit

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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTICT203 Operate application software packages

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 1.0.

Performance Evidence

Evidence of the ability to:

- produce workplace documents using a minimum of three different software application packages
- open, amend and save files and documents according to organisational requirements
- apply workplace health and safety (WHS) principles and responsibilities for ergonomics, such as work periods and breaks
- use help manuals and online help.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- identify application software packages used by the organisation and list the purpose of each
- explain basic technical terminology related to reading help files and responding to system help prompts
- outline current business practices related to using software to prepare reports
- list features and functions of commercial computing packages
- describe import and export software functions
- describe the process of linking documents
- outline WHS principles and responsibilities for ergonomics, such as work periods and breaks
- explain the purpose of input and output devices.

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Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the general information and communications technology (ICT) industry, and include access to:

- a personal computer (PC) and printer
- software currently used in industry
- documents detailing organisational style guide and policy
- documents or information containing data suitable for developing software application documents.

Assessors must satisfy NVR/AQTF assessor requirements.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTICT214 Operate application software packages

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 6.0.

Application

This unit describes the skills and knowledge required to identify, select and operate commercial software packages, including a word-processing and a spreadsheet application package.

It applies to individuals who utilise different software applications within a small to large office environment to produce diverse documents.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

General ICT

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to operate software packages	1.1 Set up workstation according to work health and safety standards and organisational requirements 1.2 Determine word-processing software task requirements 1.3 Determine spreadsheet software task requirements 1.4 Determine software application according to task requirements 1.5 Identify document purpose, audience and presentation requirements and clarify with required personnel
2. Use word-processing software	2.1 Identify document purpose, audience and presentation requirements and clarify with required personnel 2.2 Determine text-based business document style guide

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ELEMENT	PERFORMANCE CRITERIA
	requirements 2.3 Finalise documents using software and technical functions and formatting according to task requirements 2.4 Name, save and print to a Portable Document Format (PDF) according to task requirements
3. Use spreadsheet software	3.1 Identify document purpose, audience and presentation requirements and clarify with personnel as required 3.2 Enter formulas and functions and customise spreadsheet settings according to task requirements 3.3 Name, save and print to PDF document according to task requirements
4. Use third application software package	4.1 Select software application package according to task requirements 4.2 Determine purpose, audience and presentation requirements 4.3 Use technical functions, other data and formatting to finalise document 4.4 Name, save and print to PDF document according to task requirements

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

Skill	Description
Numeracy	• Adds, subtracts, multiplies and divides whole numbers and decimals, identifying and selecting formulas and functions to use • Applies order of operations in calculations
Oral communication	• Clarifies work requirements using required language, questioning and active listening techniques
Reading	• Interprets textual information and determines organisational standards and job requirements • Identifies and applies symbols, icons and text associated with applications software
Writing	• Enters both written and verbally received information and data into a format applicable to software application • Selects vocabulary, syntax, terminology, labelling and naming conventions applicable to program
Planning and	• Plans routine tasks with goals and outcomes, taking some limited

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Skill	Description
organising	responsibility in decisions regarding sequencing
Self-management	• Follows routine procedures in using digital technology and enters, stores and retrieves information directly applicable to own role
Technology	• Identifies and evaluates purposes, specific functions and key features of basic digital systems and tools • Operates digital systems and tools in completing routine tasks and adapting some functions

Unit Mapping Information

Supersedes and is equivalent to ICTICT203 Operate application software packages.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTICT214 Operate application software packages

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 6.0.

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- produce three workplace documents using three different software packages including word processing, spreadsheets and one additional software application package on at least one occasion.

In the course of the above, the candidate must:

- apply workplace health and safety (WHS) principles and responsibilities
- follow organisational requirements.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- organisational application software packages
- technical terminology applicable to reading help files and responding to system help prompts
- industry standard business practices applicable to preparing reports using
- features and functions of commercial computing packages and of the industry standard software
- functions and features of Portable Document Formats (PDFs)
- import and export software functions
- document linking functions
- WHS principles and responsibilities
- purpose of input and output devices.

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Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- required hardware device
- industry standard software
- documents detailing organisational style guide and policy
- data required in developing software application documents.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN203 Install and configure a home or small office network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required for entry level networking support to establish a small office or home office (SOHO) internet connected PC network.

It applies to individuals who may work as an installer or network technician configuring small networks with simple internet protocol (IP) addressing schemes that share a limited range of resources.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for installation of home or small office network	1.1 Prepare for given work confirming site-specific work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine nature and scope of the network and network resources from job briefs or appropriate personnel

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Select and obtain personal computer system and network device requirements according to enterprise procedures 1.5 Obtain operating instructions, manuals, hardware and software testing methodologies 1.6 Consult appropriate personnel to ensure task is coordinated effectively with others involved at the worksite
2. Install and troubleshoot home or small office network	2.1 Set up personal computer systems according to manufacturer's specifications and enterprise procedures 2.2 Set up, configure and share network resources between network devices 2.3 Determine network addressing scheme for network connectivity and confirm using calculations 2.4 Troubleshoot network and internet connectivity according to manufacturer's specifications and enterprise procedures 2.5 Identify security threats and initiate control measures according to enterprise procedures
3. Complete and document network installation	3.1 Restore worksite to safe condition according to established safety procedures 3.2 Record and store essential installation information according to enterprise procedures 3.3 Notify appropriate personnel of completion of the task according to enterprise procedures 3.4 Notify appropriate personnel and obtain sign-off

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Writing	3.2, 3.4	• Completes workplace documentation accurately using appropriate form and vocabulary for intended audience
Oral Communication	3.3, 3.4	• Conveys specific messages efficiently and uses an appropriate tone and vocabulary for intended audience

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Numeracy	2.3	• Confirms decisions using basic calculations and predictions
Navigate the world of work	1.1-1.4, 2.4, 2.5, 3.1-3.3	• Follows legislative requirements and organisational protocols, policies and procedures relevant to own role
Interact with others	1.1-1.3, 1.6	• Collaborates and cooperates with others to achieve specific outcomes
Get the work done	1.4, 1.5, 2.1-2.5	• Prioritises and plans work to meet organisational requirements and client expectations • Recognises and anticipates a range of problems, actively looking for early warning signs and implementing contingency plans when appropriate

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN203 Install and configure a home or small office network	ICTTEN2207A Install and configure a home or small office network	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN203 Install and configure a home or small office network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- implement work health and safety (WHS) workplace procedures and practices
- plan installation of an internet connected network with advice and approvals of relevant personnel
- set up and configure wired and wireless networks with simple addressing schemes
- troubleshoot network and internet connectivity
- set up resource sharing
- deploy simple firewall network security
- obtain sign-off with relevant personnel.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline correct usage of tools and equipment
- describe enterprise WHS procedures
- outline basic computer systems and network operating systems
- describe computer networking principles (wired and wireless)
- outline network addressing systems (basic)
- explain network services and associated network models and protocols
- outline network security management
- outline troubleshooting procedures.

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Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications network engineering field of work and include access to:

- a site where installation of a small office home office network may be conducted
- tools, equipment and materials currently used in the industry
- relevant workplace procedures, specifications and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN204 Install and configure a small to medium business network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to establish and support a small to medium business network capable of providing wide area network (WAN) connectivity and common web internet services.

It applies to individuals who may be working as a small to medium enterprise (SME) internet protocol (IP) network installer, network technician or SME network support person.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications networks engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for installation of small to medium enterprise network	1.1 Prepare for given work, confirming site-specific work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel

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ELEMENT	PERFORMANCE CRITERIA
	1.3 Determine nature and scope of business network and network resources from job briefs or appropriate personnel 1.4 Select and obtain computer system and network device requirements according to enterprise procedures 1.5 Obtain operating instructions, manuals, hardware and software testing methodologies 1.6 Consult appropriate personnel to ensure the task is coordinated effectively with others involved at worksite
2. Install and configure small to medium enterprise network	2.1 Set up wired infrastructure according to manufacturer's specifications and enterprise procedures 2.2 Set up and configure resource sharing on a network server 2.3 Install WAN connection and ISP services and configure according to enterprise procedures 2.4 Troubleshoot network and internet connectivity according to manufacturer's specifications and enterprise procedures 2.5 Implement data back-up and disaster recovery measures according to enterprise procedures
3. Complete and document network installation	3.1 Restore worksite to safe condition according to established safety procedures 3.2 Record and store essential installation information according to enterprise procedures 3.3 Notify appropriate personnel of completion of the task according to enterprise procedures 3.4 Notify customer and obtain sign-off

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.3	• Identifies and interprets scope of job and relevant procedures
Writing	3.2, 3.4	• Completes workplace documentation accurately using appropriate form and vocabulary for the intended

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		audience
Oral Communication	3.3, 3.4	• Conveys specific messages efficiently and uses an appropriate tone and vocabulary for intended audience
Numeracy	1.3, 2.1	• Makes calculations appropriate for measuring and estimating materials and for installation
Navigate the world of work	1.1-1.3, 2.1, 2.3-2.5, 3.1-3.3	• Follows legislative requirements and organisational protocols, policies and procedures relevant to own role
Interact with others	1.1-1.3, 1.6	• Collaborates and cooperates with others to achieve desired outcomes
Get the work done	1.4, 1.5, 2.3-2.5	• Prioritises and plans work to meet organisational standards, regulatory requirements and client expectations • Recognises and anticipates a range of problems, actively looking for early warning signs and implementing contingency plans when appropriate • Uses digital technologies and systems to complete work tasks

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN204 Install and configure a small to medium business network	ICTTEN2208A Install and configure a small to medium business network	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN204 Install and configure a small to medium business network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- implement work health and safety (WHS) workplace procedures and practices
- plan installation of a network that uses subnet addressing and provides internet service provider (ISP) services
- set up and configure wired infrastructure
- troubleshoot local network and wide area network (WAN) connectivity and services
- configure resource sharing on a network server
- provide network data back-up and disaster recovery.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- identify correct usage of tools and equipment
- outline data back-up services and procedures
- describe enterprise WHS procedures
- define ISP services
- outline network device configuration
- describe network models and topologies
- define subnet addressing
- outline troubleshooting procedures
- describe WAN services and ISP responsibilities.

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Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the telecommunications network engineering field of work and include access to:

- a site where installation of a small to medium business network may be conducted
- tools, equipment and materials currently used in industry
- relevant workplace procedures
- product and manufacturing specifications and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN205 Build and maintain a secure network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to build a simple and secure wired local area network (LAN) or wide area network (WAN) using a range of client server applications and services.

It applies to individuals who may work in job roles such as an installer of internet protocol (IP) networks, a WAN and LAN network technician or a WAN and LAN network support person.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to build LAN or WAN	1.1 Prepare for given work confirming site-specific work health and safety (WHS) and environmental requirements, with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine network design specification from job briefs or

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ELEMENT	PERFORMANCE CRITERIA
	appropriate personnel 1.4 Determine network addressing scheme for network connectivity and confirm using calculations 1.5 Select and obtain network hardware according to established procedures 1.6 Obtain operating instructions, manuals, hardware and software testing methodologies 1.7 Consult appropriate personnel to ensure the task is coordinated effectively with others involved at the worksite
2. Build and verify network	2.1 Establish connections between network hardware according to manufacturer's specifications and established procedures 2.2 Verify network routing and switching to conform to network design specification 2.3 Set up, configure and share network resources between network devices
3. Monitor network performance and troubleshoot network	3.1 Monitor network traffic and assess performance metrics against manufacturer's specifications and established procedures 3.2 Identify security threats and initiate control measures according to enterprise procedures 3.3 Troubleshoot network and internet connectivity according to manufacturer's specifications and enterprise procedures
4. Complete and document network build	4.1 Restore worksite to safe condition according to established safety procedures 4.2 Record and store network schematics and network addressing scheme 4.3 Notify appropriate personnel of completion of the task 4.4 Notify customer and obtain sign-off

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description

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Reading	1.3, 2.1	• Identifies and interprets scope of job and relevant procedures
Writing	4.2, 4.4	• Completes workplace documentation accurately using appropriate form and vocabulary for intended audience
Oral Communication	4.3, 4.4	• Articulates specific messages in a tone and manner appropriate for intended audience
Numeracy	1.4, 3.1	• Confirms and checks decisions using basic calculations and predictions
Navigate the world of work	1.1, 1.2, 1.4, 1.5, 2.1, 3.1-3.3, 4.1	• Follows legislative requirements and organisational protocols, policies and procedures relevant to own role
Interact with others	1.1-1.3, 1.7,	• Collaborates and cooperates with others to achieve specific outcomes
Get the work done	1.5, 1.6, 2.1, 2.2, 3.1-3.3, 4.2	• Plans and prioritises tasks, developing and implementing a work program in line with organisational expectations, legislative requirements and work role • Recognises and anticipates a range of problems, actively looking for early warning signs and implementing contingency plans when appropriate • Uses digital technologies and systems to complete required tasks

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN205 Build and maintain a secure network	ICTTEN2209A Build and maintain a secure network	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN205 Build and maintain a secure network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- effectively implement work health and safety (WHS) workplace procedures and practices
- develop a network addressing scheme
- determine required network components to build the network
- plan, build, configure, test and analyse performance of a network
- troubleshoot network problems.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- describe enterprise WHS procedures
- explain internet and computer network communication
- outline network addressing schemes including open systems interconnect (OSI) and transmission control protocol (TCP)/IP model
- describe planning the cabling of ethernet networks
- define the seven layer OSI model
- identify correct tool and equipment usage
- identify troubleshooting procedures.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications network engineering field of work and include access to:

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- a site where building and maintenance of secure network may be conducted
- tools, equipment and materials currently used in industry
- relevant workplace procedures
- product and manufacturing specifications and reference material.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN312 Install telecommunications network equipment

Modification History

Release	Comments
Release 1	This version released with ICT Information and Communications Technology Training Package Version 5.0.

Application

This unit describes the skills and knowledge required to effectively install and test telecommunications network equipment. It includes processes for checking plans, obtaining equipment, and handling equipment and supplies.

It applies to field officers, technicians or technical supervisors working for carriers, contractors or other service providers who install switching, transmission and radio networks and various transmission paths. It includes cable, optical fibre, radio, microwave and satellite telecommunications equipment.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Network Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Plan for installation of telecommunications network equipment	1.1 Prepare for given work according to relevant work health and safety (WHS) and environmental requirements 1.2 Obtain access to site and assess the options for network installation 1.3 Identify existing and potential site hazards 1.4 Verify network equipment installation according to appropriate plans obtained from authorised personnel

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ELEMENT	PERFORMANCE CRITERIA
	1.5 Investigate how equipment is to be connected to existing network systems 1.6 Develop and finalise installation plans to ensure minimal workplace disruption according to relevant legislation, regulations, codes and standards 1.7 Obtain tools and test equipment required for safe work practice 1.8 Notify affected parties of possible network outage
2 Install network hardware and cabling	2.1 Install network equipment according to plan and manufacturer instructions, using safe industry practices 2.2 Install equipment or insert equipment cards and modules 2.3 Install all cables according to specifications 2.4 Confirm service interruption is within limits agreed with customer 2.5 Document all installation drawings for customer
3 Install equipment accessories	3.1 Install alarms according to instruction manuals and specifications 3.2 Install operations administration and maintenance system according to specification 3.3 Install communication facilities for operational staff according to specification, taking into account any special needs of site and operational staff 3.4 Install operator communication facilities according to needs and specifications
4 Configure and test system	4.1 Install software and configuration instructions according to system specifications as required 4.2 Test to verify system performance according to customer requirements 4.3 Recommend changes as required and confirm with customer 4.4 Record all test results
5 Clean-up worksite and complete documentation	5.1 Remove and dispose of installation waste and debris from worksite according to environmental requirements 5.2 Restore changes made to work area during installation according to customer satisfaction 5.3 Complete all installation documents and present to customer 5.4 Declare asset ready for commissioning and integration 5.5 Notify customer and obtain sign-off

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Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance, but not explicit in the performance criteria.

Skill	Description
Reading	• Interprets information from plans, specifications and manufacturer instruction manuals
Writing	• Uses clear and specific terminology to produce installation plans and instructions appropriate for audience • Records results of tests in required format using industry-specific language
Oral Communication	• Uses appropriate strategies to establish and maintain dialogue, notify parties of disruptions and changes to planned work
Numeracy	• Accurately interprets measurements from plans and applies results to installation plans and documents • Calibrates test equipment and calculates and compares results with specifications
Navigate the world of work	• Takes personal responsibility for following explicit and implicit policies, procedures and legislative requirements • Identifies and acts on issues that contravene relevant policies, procedures and legal requirements
Interact with others	• Follows accepted communication practices and protocols • Uses a range of strategies to establish a sense of connection and build rapport with customers and co-workers
Get the work done	• Takes responsibility for planning, sequencing and prioritising tasks and own workload for efficiency and effective outcomes, occasionally negotiating changes • Maintains required records and reports according to enterprise requirements • Makes routine decisions and implements standard procedures for routine tasks, using formal decision-making processes for more complex and non-routine situations

Unit Mapping Information

ICTTEN312 Install telecommunications network equipment supersedes and is equivalent to ICTTEN302 Install telecommunications network equipment.

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Links

Companion Volume Implementation Guides are available from VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN312 Install telecommunications network equipment

Modification History

Release	Comments
Release 1	This version released with ICT Information and Communications Technology Training Package Version 5.0.

Performance Evidence

The candidate must demonstrate the ability to perform the tasks outlined in the elements, performance criteria, and foundation skills, and to:

- plan for and install network hardware and cabling according to equipment or system manuals and customer specifications
- configure and test installation
- verify cable continuity
- comply with all work health and safety (WHS) and environmental requirements and work practices
- notify customer of work progress and obtain sign-off.

Note: Evidence must be provided at least once when a specific volume or frequency is not stated.

Knowledge Evidence

The candidate must demonstrate the knowledge required to perform the tasks outlined in the elements, performance criteria, and foundation skills, which includes knowledge about:

- WHS requirements and environmental procedures relating to the activity and site conditions
- cabling types, connectors and cabling structures
- equipment and connections to carrier infrastructure and internet service provider (ISP) technologies for single and multi-dwelling environments:
  - carrier, asymmetric digital subscriber line, very-high-bit-rate digital subscriber line, fibre network termination device (NTD), hybrid fibre coaxial (HFC) modems
- electrical and/or optical properties of installation
- network and transmission equipment principles
- power requirements and electrical safety

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- typical performance parameters and faults that may be encountered in customer equipment and related connection and transmission media
- various test equipment types suitable for tests to be made
- handling and environmental compliance for waste disposal.
-

Assessment Conditions

Skills must be assessed in a workplace or simulated environment where conditions are typical of those in a telecommunications work environment or workplace.

Access is required to:

- site/s where installation of telecommunications network equipment can be conducted
- network testing equipment currently used in industry
- relevant regulatory and equipment documentation that impact telecommunications network equipment installation activities.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guides are available from VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN419 Implement and troubleshoot enterprise routers and switches

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to determine customer needs, use information communication technologies (ICT) to meet network requirements, rectify equipment errors and create appropriate workplace documentation.

It applies to individuals working as installers of internet protocol (IP) networks, enterprise network technicians, network administrators and other network support personnel.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1 Prepare for implementation of network routers and switches	1.1 Prepare for given job according to work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine nature and scope of network routers, network switches and network resources from job briefs or appropriate

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ELEMENT	PERFORMANCE CRITERIA
	personnel 1.4 Select and obtain network services and network application requirements according to enterprise procedures 1.5 Obtain identified operating instructions, manuals, hardware and software testing methodologies 1.6 Consult appropriate personnel to ensure the task is coordinated effectively with others involved at the worksite
2 Implement network switches and routers	2.1 Configure routers and switches according to manufacturer's specifications and enterprise procedures 2.2 Determine network addressing scheme for network connectivity, and verify using calculations 2.3 Activate, and verify wide area network (WAN) links provide network connectivity 2.4 Enable network services and network applications to the network to complete network connectivity process 2.5 Set up traffic access and filtering according to enterprise procedures
3 Troubleshoot network switches and routers	3.1 Monitor network performance and isolate faults using diagnostic and analysis tools 3.2 Troubleshoot network and internet connectivity according to manufacturer's specifications and enterprise procedures
4 Document configuration and troubleshooting records	4.1 Restore work-site to safe condition according to established safety procedures 4.2 Record and store essential implementation information according to enterprise procedures 4.3 Notify appropriate personnel of completion of the task according to enterprise procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description

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Reading	1.1, 1.3, 1.4, 2.1, 2.5, 3.2, 4.2, 4.3	• Recognises and interprets technical, legislative and operational documentation to determine job requirements
Writing	1.1, 1.2, 4.2, 4.3	• Uses clear, specific and industry-related terminology to produce and update workplace documentation and in communications with relevant personnel
Oral Communication	1.1-1.3, 4.3	• Clearly liaises with personnel on technical matters • Uses listening and questioning skills to confirm understanding for requirements
Numeracy	2.2	• Interprets technical data and performs calculations to verify information
Navigate the world of work	1.1, 1.2, 4.1	• Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, and draws attention to any issues that may affect self or others • Recognises and follows explicit and implicit protocols and meets expectations associated with own role
Interact with others	1.6	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction
Get the work done	1.4, 1.5, 2.1-2.5, 3.1, 3.2	• Understands key principles and concepts underpinning design and operation of digital systems and tools, and applies these as required including troubleshooting common network problems • Takes responsibility for planning and organising own workload, identifying ways of sequencing and combining elements for greater efficiency • Implements actions according to a predetermined plan, making adjustments if necessary • Makes decisions quickly and intuitively in familiar situations requiring immediate attention, drawing on past experience to identify key variables and determine the best course of action • Recognises and anticipates an increasing range of unexpected problems, their symptoms and causes on the basis of safety and specified work outcomes

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Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN419 Implement and troubleshoot enterprise routers and switches	ICTTEN4210A Implement and troubleshoot enterprise routers and switches	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN419 Implement and troubleshoot enterprise routers and switches

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- determine customer networking requirements
- configure routers and switches using hierarchical addressing over virtual local area networks (VLANs) to meet network link requirements
- enable and control access to network services and applications across the network
- diagnose and rectify network hardware and device configuration faults
- document configuration information, fault-finding history and remediation action.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- summarise access control lists
- give examples of characteristics of a typical enterprise including:
  - features and applications
  - work health and safety (WHS) procedures
  - record keeping procedures
  - switching and routing protocols and strategies:
    - hierarchical addressing
    - multilayer switching
    - routing protocols
    - VLAN routing
- summarise implementation of enterprise wide area networks (WAN) links
- explain network diagnostic and troubleshooting techniques
- describe network modelling

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- specify how to configure and activate network access and security measures
- describe the process of configuring switches and routers to enable local area networks (LAN) and WAN links
- describe the connection process for enterprise networks using WAN services and applications
- describe the purpose of maintaining enterprise network documentation
- summarise the process and importance of troubleshooting network faults and implementing recovery actions
- describe the use of a hierarchical internet protocol (IP) network address scheme
- select and use tools and equipment to analyse enterprise networks.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- a network facility and workstations
- operating instructions, installation documents and manuals
- hardware and software testing tools currently used in industry.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN420 Design, install and configure an internetwork

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to determine customer needs, create appropriate workplace documentation, connect and organise an internetwork according to design specifications, resolving technical problems as they arise.

It applies to individuals who design and install internet protocol (IP) networks including enterprise internetwork technicians, network administrators and network support personnel for large, medium and small office home office (SOHO) enterprises.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for design and installation of internetwork	1.1 Prepare for given work according to work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine nature and scope of internetwork from job briefs and appropriate personnel

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Obtain operating instructions, manuals, hardware and software testing methodologies 1.5 Consult appropriate personnel to ensure the task is coordinated effectively with others involved at the worksite
2. Design enterprise internetwork	2.1 Produce enterprise internetwork topology after considering technical requirements, physical and financial constraints and expansion projections 2.2 Determine network devices and network resources, according to enterprise procedures 2.3 Produce internetwork design including network security and router and switch configurations to meet design specifications and enterprise procedures
3. Install and configure designed internetwork	3.1 Install network hardware to network topology design plan according to enterprise procedures 3.2 Determine network addressing scheme for network connectivity, and verify using calculations 3.3 Configure routers and switches to perform logical connection of the internetwork 3.4 Conduct connectivity and performance tests to verify network installation meets design specification 3.5 Troubleshoot internetwork and internet connectivity according to manufacturer's specifications and enterprise procedures
4. Complete and document network design and installation	4.1 Restore worksite to safe condition according to established safety procedures 4.2 Record and store essential design and installation information according to enterprise procedures 4.3 Notify appropriate personnel of completion of the task according to enterprise procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description

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Reading	1.1, 1.3, 2.2, 2.3, 3.1, 3.4, 3.5, 4.2, 4.3	• Recognises and interprets legislation, enterprise procedures, manuals and technical specifications to determine job requirements
Writing	2.1, 2.3, 4.2, 4.3	• Uses clear, specific and industry-related terminology to produce network documentation and maintain network records • Writes concisely when communicating with relevant personnel
Oral Communication	1.2, 4.3	• Negotiates with customers and peers to achieve design specifications • Uses listening and questioning skills to confirm understanding for requirements
Numeracy	3.2	• Interprets technical data and performs calculations to verify information
Navigate the world of work	1.1, 1.2, 2.2, 2.3, 3.1, 3.5, 4.1-4.3	• Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, and draws attention to any issues that may affect self or others • Recognises and follows organisational procedures protocols and meets expectations associated with own role
Interact with others	1.3, 1.5	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction
Get the work done	1.4, 2.1, 2.3, 3.1, 3.3-3.5	• Understands key principles and concepts underpinning design and operation of digital systems and tools, and applies these as required including troubleshooting common network problems according to helpdesk procedures • Takes responsibility for planning and organising own workload, identifying ways of sequencing and combining elements for greater efficiency • Implements actions according to a predetermined plan, making adjustments if necessary • Makes decisions quickly and intuitively in familiar situations requiring immediate attention, drawing on past experience to identify key variables and determine the best course of action • Recognises and anticipates an increasing range of unexpected problems, their symptoms and causes, on the basis of safety and specified work outcomes

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Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN420 Design, install and configure an internetwork	ICTTEN4211A Design, install and configure an internetwork	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN420 Design, install and configure an internetwork

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- determine customer requirements
- design internetwork that uses advanced routing and addressing techniques
- install internetwork according to design specification
- configure network devices to meet design functionality
- document internetwork design, installation and configuration.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- describe enterprise work health and safety (WHS) procedures
- summarise open systems interconnect (OSI) layered communication model
- outline network requirements including:
  - applications
  - lifecycle
  - manageability
  - quality of service
- clarify network design concepts including:
  - business requirements
  - network topologies
  - physical and financial constraints
  - security
  - wired or wireless options

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- describe tool and equipment use
- outline troubleshooting components of this work including:
  - impact of network failure
  - maintenance
  - troubleshooting methodologies
- analyse impact of applications on traffic flow in the network
- describe network design methodologies used to design networks providing a range of services and applications found in larger networks
- define technical requirements, constraints and manageability issues for a given customer network
- identify and describe common tools and equipment used in internet work.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- a site where design and installation of an internetwork network may be conducted
- tools, equipment and materials currently used in industry
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN421 Apply advanced routing protocols to network design

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to use software tools, equipment, software and protocols to configure and troubleshoot network routers.

It applies to individuals who work cooperatively with others, interpret technical information accurately and work proficiently with information communication technology (ICT). Installers of internet protocol (IP), small and medium sized enterprise (SME) network technicians, network administrators and network support personnel complete this type of work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Plan to apply routing protocols	1.1 Prepare for given work according to work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine nature and scope of network and network routing

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ELEMENT	PERFORMANCE CRITERIA
	requirements from job briefs and appropriate personnel 1.4 Determine hardware and software diagnostic test methodologies and testing resources according to enterprise procedures 1.5 Obtain operating instructions, manuals, hardware and software testing methodologies 1.6 Consult appropriate personnel to ensure task is coordinated effectively with others involved at the worksite
2. Build and test advanced routing	2.1 Set up router interfaces according to manufacturer's specifications and established procedures 2.2 Implement advanced routing protocols to achieve network design requirements 2.3 Implement classless addressing across a network to perform logical connectivity, and confirm using calculations 2.4 Troubleshoot network routing according to manufacturer's specifications and established procedures 2.5 Identify security threats and initiate control measures according to enterprise procedures
3. Complete and document advanced router installation	3.1 Restore worksite to safe condition according to established safety procedures 3.2 Record and store essential installation information according to enterprise procedures 3.3 Notify appropriate personnel of completion of the task according to enterprise procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 1.3, 2.1, 2.4, 2.5, 3.2, 3.3	• Recognises and interprets enterprise procedures, manuals and specifications to determine job requirements
Writing	1.2, 3.2, 3.3	• Uses clear, specific and industry-related terminology to develop network documentation and maintain network records

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		• Writes concisely when communicating with relevant personnel
Oral Communication	1.2, 1.3, 3.3	• Liaises and negotiates with customers and peers to achieve design specifications • Uses listening and questioning skills to confirm understanding for requirements
Numeracy	2.3	• Interprets technical data and performs calculations to verify information
Navigate the world of work	1.1, 1.4, 2.4, 2.5, 3.1-3.3	• Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work context and draws attention to any issues that may affect self or others • Recognises and follows organisational procedures and protocols and meets expectations associated with own role
Interact with others	1.6	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction
Get the work done	1.4, 1.5, 2.1-2.5, 3.2	• Understands key principles and concepts underpinning design and operation of digital systems and tools, and applies these as required including troubleshooting common network problems according to helpdesk procedures • Takes responsibility for planning and organising own workload, identifying ways of sequencing and combining elements for greater efficiency • Implements actions according to a predetermined plan, making adjustments if necessary • Makes decisions quickly and intuitively in familiar situations requiring immediate attention, drawing on past experience to identify key variables and determine the best course of action • Recognises and anticipates an increasing range of unexpected problems, their symptoms and causes on the basis of safety and specified work outcomes

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**

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Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN421 Apply advanced routing protocols to network design	ICTTEN4212A Apply advanced routing protocols to network design	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN421 Apply advanced routing protocols to network design

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- plan network routing requirements to meet design specification
- configure advanced protocols on network routers
- manage network addressing
- troubleshoot network
- install network security.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- explain distance vector routing protocols RIP v1 and v2
- outline dynamic routing
- summarise enterprise work health and safety (WHS) procedures
- outline hybrid routing protocols enhanced interior gateway routing protocol (EIGRP)
- explain link-state routing protocols open shortest path first (OSPF)
- explain routing and packet forwarding
- describe routing tables
- summarise scalable routing strategies variable length subnet masking (VSLM) and classless inter-domain routing (CIDR)
- outline security protocols using access lists
- clarify static routing
- explain the use of software tools and equipment.

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Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- a network facility and workstations
- tools, equipment and materials currently used in industry
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN422 Configure and troubleshoot advanced network switching

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to perform network switch configuration and troubleshooting. This unit applies to large networks involving wireless local area networks (WLANs), virtual local area networks (VLANs), interVLAN routing, remote access management and operating system management of network devices.

It applies to individuals who work cooperatively with others, interpret technical information accurately, and work proficiently with information communication technology (ICT). Installers of internet protocol (IP), enterprise network technicians, network administrators and network support personnel complete this type of work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to work on switched network	1.1 Prepare for given work according to work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in

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ELEMENT	PERFORMANCE CRITERIA
	consultation with appropriate personnel 1.3 Determine nature and scope of network and network topology from job briefs or appropriate personnel 1.4 Select and obtain wireless and wired network components requirements according to enterprise procedures 1.5 Obtain operating instructions, manuals, hardware and software testing methodologies 1.6 Consult appropriate personnel to ensure task is coordinated effectively with others involved at the worksite
2. Configure network switches	2.1 Set up and configure network switches according to manufacturer's specifications and enterprise procedures 2.2 Build and configure a routed network using remote access management 2.3 Establish multiple VLANs across the network to manage access and traffic across the network
3. Troubleshoot network	3.1 Monitor network traffic and assess performance against manufacturer's specifications and established procedures 3.2 Troubleshoot network according to manufacturer's specifications and enterprise procedures 3.3 Identify and rectify faults according to enterprise procedures
4. Complete and document network installation and configuration	4.1 Restore worksite to safe condition according to established safety procedures 4.2 Record and store essential configuration information according to enterprise procedures 4.3 Notify appropriate personnel of completion of the task according to enterprise procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 1.3, 1.4, 2.1,	• Recognises and interprets enterprise procedures, manuals and specifications to determine job

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	3.2, 3.3, 4.2, 4.3	requirements
Writing	4.2, 4.3	• Uses clear, specific and industry-related terminology to develop network documentation and maintain network records • Writes concisely when communicating with relevant personnel
Oral Communication	1.2, 1.3, 4.3	• Liaises and negotiates with customers and peers to achieve outcomes • Uses listening and questioning skills to confirm understanding of requirements
Numeracy	2.2, 2.3, 3.1-3.3	• Interprets technical data and performs calculations to verify information
Navigate the world of work	1.1, 1.2, 2.1, 3.1-3.3, 4.1-4.3	• Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, and draws attention to any issues that may affect self or others • Recognises and follows organisational procedures and protocols and meets expectations associated with own role
Interact with others	1.6	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction • Selects and uses appropriate conventions and protocols when communicating with co-workers in a range of work contexts
Get the work done	1.4, 1.5, 2.1-2.3, 3.1-3.3	• Understands key principles and concepts underpinning design and operation of digital systems and tools, and applies these as required including troubleshooting network malfunctions • Takes responsibility for planning and organising own workload, identifying ways of sequencing and combining elements for greater efficiency • Implements actions according to a predetermined plan, making adjustments if necessary • Makes decisions quickly and intuitively in familiar situations requiring immediate attention, drawing on past experience to identify key variables and determine the best course of action • Recognises and anticipates an increasing range of unexpected problems, their symptoms and causes, on the basis of safety and specified work outcomes

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Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN422 Configure and troubleshoot advanced network switching	ICTTEN4213A Configure and troubleshoot advanced network switching	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN422 Configure and troubleshoot advanced network switching

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- build and configure a routed network
- configure a virtual local area networks (VLAN) on a given network topology
- configure VLAN trunking and spanning tree protocols
- establish VLANs over a wireless network
- design and deploy remote access and network security.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline enterprise work health and safety (WHS) procedures
- explain interVLAN routing
- describe spanning tree protocol
- clarify switch and remote network security management
- describe the tool and equipment required, and their correct usage
- outline troubleshooting procedures
- summarise VLAN trunking protocol
- explain wireless local area network (LAN) set-up and access configuration.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

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- a site where configuring advanced network switching may be conducted
- tools, equipment and materials currently used in industry
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTTEN423 Install and maintain a wide area network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to use appropriate tools, equipment, software and protocols to connect and support a wide area network (WAN).

It applies to individuals who work cooperatively with others, interpret technical information accurately and work proficiently with information communication technology (ICT). Installers of internet protocol (IP) networks, IP network technicians, network administrators and network support personnel complete this type of work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare for installation and maintenance of network with WAN access	1.1 Prepare for given work according to work health and safety (WHS) and environmental requirements with appropriate personnel 1.2 Identify safety hazards and implement risk control measures in consultation with appropriate personnel 1.3 Determine network nature and scope from job briefs or appropriate personnel

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Select and obtain network hardware, software, WAN protocol and technology requirements according to enterprise procedures 1.5 Obtain operating instructions, manuals, installation procedures, hardware and software testing methodologies and testing resources 1.6 Consult appropriate personnel to ensure task is coordinated effectively with others involved at the worksite
2. Install and maintain WAN accessible network	2.1 Determine network addressing scheme for network connectivity, and confirm using calculations 2.2 Identify security threats and initiate control measures according to enterprise procedures 2.3 Set up and configure network to provide WAN access according to manufacturer's specifications and enterprise procedures 2.4 Use hardware and software analysis and diagnostic methodologies to test network connectivity
3. Complete and document WAN network installation	3.1 Restore worksite to safe condition according to established safety procedures 3.2 Record and store essential installation information according to enterprise procedures 3.3 Notify appropriate personnel of completion of the task according to enterprise procedures

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 1.3, 1.4, 2.2, 2.3, 3.2, 3.3	• Recognises and interprets enterprise procedures, manuals and specifications to determine job requirements
Writing	1.2, 3.2, 3.3	• Uses clear, specific and industry-related terminology to develop network documentation and maintain network records • Writes concisely when communicating with relevant personnel

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Oral Communication	1.2, 1.3, 1.6, 3.3	• Liaises and negotiates with others to achieve outcomes • Uses listening and questioning skills to confirm understanding for requirements
Numeracy	2.1	• Interprets technical data and performs calculations to verify information
Navigate the world of work	1.1, 1.2, 1.4, 2.2, 2.3, 3.1-3.3	• Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, and draws attention to any issues that may affect self or others • Recognises and follows organisational procedures and protocols and meets expectations associated with own role
Interact with others	1.6	• Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction
Get the work done	1.4, 1.5, 2.1-2.4, 3.2, 3.3	• Understands key principles and concepts underpinning design and operation of digital systems and tools, and applies these as required including using industry-standard troubleshooting • Takes responsibility for planning and organising own workload, identifying ways of sequencing and combining elements for greater efficiency • Implements actions according to a predetermined plan, making adjustments if necessary • Makes decisions quickly and intuitively in familiar situations requiring immediate attention, drawing on past experience to identify key variables and determine the best course of action • Recognises and anticipates an increasing range of unexpected problems, their symptoms and causes, on the basis of safety and specified work outcomes

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTTEN423 Install and maintain a wide area	ICTTEN4214A Install and maintain a wide area network	Updated to meet Standards for Training	Equivalent unit

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Code and title current version	Code and title previous version	Comments	Equivalence status
network		Packages.	

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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Assessment Requirements for ICTTEN423 Install and maintain a wide area network

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Performance Evidence

Evidence of ability to:

- plan installation of a wide area network (WAN) accessible network
- select and apply WAN link protocols
- configure internet protocol (IP) addressing across WAN
- troubleshoot WAN communication issues
- install WAN access security measures.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline enterprise work health and safety (WHS) procedures
- explain IP addressing services and network scaling
- summarise methods of securing network services including access control lists
- explain Open Systems Interconnection (OSI) layered communication model
- outline requirements to provide teleworker network services
- describe correct usage of relevant tools and equipment
- outline WAN link protocols including:
  - frame relay
  - high-level data link control (HDLC)
  - link access procedure, balanced (LAPB)
  - point-to-point protocol (PPP)
- summarise WAN troubleshooting methodologies and analysis and diagnostic tools.

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Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- a site where installation and maintenance of a WAN may be conducted
- tools, equipment and materials currently used in industry
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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MEM16006 Organise and communicate information

Modification History

Release 1. Supersedes and is equivalent to MEM16006A Organise and communicate information

Application

This unit of competency covers the skills and knowledge required to access, organise and communicate information related to production, maintenance or associated processes or tasks that apply in manufacturing, engineering or related environments.

For accessing and recording of data requiring system knowledge and judgement, Unit MEM16008 Interact with computing technology should be selected.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: **A**

Unit Weight: **2**

Pre-requisite Unit

MEM13015 Work safely and effectively in manufacturing and engineering

Competency Field

Communication

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	**Access information**	1.1	Determine information requirements of tasks and access relevant information from a range of sources
		1.2	Recognise and use workplace terminology correctly
2	**Organise and**	2.1	Interpret information and organise in accordance with

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Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
	analyse information		work requirements
		2.2	Determine relevance and implications for immediate work requirements
3	**Communicate organised information using established workplace methods**	3.1	Identify purpose of communication and appropriate communication method
		3.2	Communicate information using established workplace methods

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Range of sources include using one (1) or more of the following:

- job instructions
- specifications
- standard operating procedures (SOPs)
- charts
- lists
- documents
- computer data
- drawings
- sketches
- tables
- technical manuals and/or charts
- other applicable reference material

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This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Determining relevance of information includes one (1) or more of the following:	• checking relevance of information to own work • selecting task relevant information from a larger document or from a diagram • preparing an opinion based on analysis of simple facts • expressing an opinion on the cause of faults
Workplace terminology refers to one (1) or more of the following:	• equipment • processes • workplace areas • staff • procedures
Established workplace methods include using one (1) or more of the following:	• proforma reports • data entry • verbal • drawings
Purpose of communication includes one (1) or more of the following:	• simple incident/non-conformance report • maintenance request • production records • material usage records • work records • other standard workplace records

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM16006A Organise and communicate information

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2

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Assessment Requirements for MEM16006 Organise and communicate information

Modification History

Release 1. Supersedes and is equivalent to MEM16006A Organise and communicate information

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- accessing and recording relevant information from a range of sources
- recognising and using workplace appropriate terminology
- reading, interpreting and following information in workplace documentation
- checking and clarifying information
- organising, categorising and sequencing information
- communicating using appropriate methods and procedures for a variety of situations.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures
- types of information relevant to the workplace and required tasks
- terminology used in the workplace relevant to own work
- available sources of information
- information analysis techniques appropriate to tasks and position
- methods of categorising and organising information including correct sequencing of information
- methods of recording and communicating information.

Assessment Conditions

- Assessors must:
  - have vocational competency in organising and communicating information at least to the level being assessed with relevant industry knowledge and experience

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  - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011,* its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2

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MEM16008 Interact with computing technology

Modification History

Release 1. Supersedes and is equivalent to MEM16008A Interact with computing technology

Application

This unit of competency defines the skills and knowledge required to use a range of computing technology typically used in manufacturing, engineering or related environments to access, input and store information.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: **A**

Unit Weight: **2**

Pre-requisite Unit

MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

Competency Field

Communication

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	**Determine job requirements**	1.1	Follow standard operating procedures and comply with work health and safety (WHS) requirements at all times
		1.2	Identify job requirements from specifications, job sheets or work instructions
		1.3	Identify information/data required to be accessed, input

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Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
			or stored and its source
2	**Access information/data**	2.1	Follow access procedures and navigate technology to find the required information/data
		2.2	Use relevant software application menus, functions and commands to locate required information/data
		2.3	Retrieve information/data using organisational procedures
		2.4	Check information/data for relevance to job requirements
3	**Input information/data**	3.1	Use relevant software menus, functions and commands to manipulate information/data
		3.2	Enter, change or remove information/data, as required
4	**Store information/data**	4.1	Save data/files following standard procedures prior to exiting the application
		4.2	Produce data output, as required
		4.3	Follow procedures for shutting down/logging off/exiting computing technology
5	**Access assistance as required**	5.1	Identify appropriate personnel and consult, as required
		5.2	Identify manuals, online help and other reference materials and use, as required

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Access procedures include one (1) or more of the following:	• logging on • security procedures • virus checks • start-up routines • application start-up
Technology includes one (1) or more of the following:	• hand held data recording devices • screen based equipment • personal computers • bar coders • tablets
Applications include one (1) or more of the following:	• word processing • spreadsheets • databases • customised engineering and manufacturing applications • material resource planning (MRP) • warehousing inventory applications • predictive reliability and maintenance applications • production data management applications
Data output includes one (1) or more of the following:	• report • email • chart • graph • printout • data transfer • labels

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM16008A Interact with computing technology

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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2

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Assessment Requirements for MEM16008 Interact with computing technology

Modification History

Release 1. Supersedes and is equivalent to MEM16008A Interact with computing technology

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- accessing, inputting, manipulating and storing information using workplace computing technology whilst following standard procedures
- accessing assistance, where required.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures
- functions and capabilities of computing technology used in the workplace
- functions of software applications
- use and features of data outputs.

Assessment Conditions

- Assessors must:
  - have vocational competency in interacting with computing technology at least to the level being assessed with relevant industry knowledge and experience
  - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills

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- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2

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MEM30031A Operate computer-aided design (CAD) system to produce basic drawing elements

Modification History

Release 1 - New unit of competency

Unit Descriptor

This unit of competency covers the skills and knowledge required to apply functions of computer-aided design (CAD) software programs that are typically used in the production of detail drawings.

Application of the Unit

This unit is suitable for those working within a CAD or drafting work environment and may be applied across engineering and manufacturing environments. It covers competent use of a CAD program to perform basic drawing tasks used in the development of detail drawings. Drawings may include plans, diagrams, charts, circuits, systems or schematics.

This unit includes using computer equipment and selecting software functions in order to generate basic drawing elements.

Work is conducted under supervision.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of

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performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Confirm drawing requirements	1.1	Confirm purpose, scope, and information and presentation requirements for drawing
		1.2	Review available information relevant to project and work requirements, and identify and address further information needs
		1.3	Identify computing equipment and software used in the organisation
		1.4	Identify work flow and procedures for work supervision
		1.5	Examine requirements for presentation of drawings
2	Identify key features of CAD software	2.1	Describe types of CAD software used for detail drafting, their key features and suitability for producing specific drawing outcomes
		2.2	Describe types of CAD software used for design drafting, their key features and suitability for producing specific drawing outcomes
		2.3	Identify differences in CAD process to generate 2-D drawings and 3-D models, and reasons for each presentation
		2.4	Identify differences in CAD process to generate single and multiple view drawings, and reasons for each presentation
		2.5	Identify CAD software used in the organisation and confirm compatibility with other software programs and peripheral equipment
		2.6	Identify software features for linked specifications, catalogues or materials ordering
3	Access software and set up for	3.1	Open software and navigate organisational filing and library system

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	drawing work	3.2	Identify organisational and software templates and determine uses
		3.3	Identify organisational symbols, codes and standards to be applied in drafting work and how these are accessed and applied
		3.4	Apply workplace procedures to retrieve and manipulate required information and navigate computing technology
		3.5	Set up working environment
4	Produce basic drawing elements	4.1	Use CAD functions to produce basic drawing elements
		4.2	Use editing and transfer tools and methods to modify drawing elements
		4.3	Apply dimensions, text and symbols to drawing elements
		4.4	Import and export files into/out of working space
		4.5	Generate different views and perspectives
		4.6	Organise presentation of work
5	Complete CAD operations	5.1	Save and file drawing elements according to organisational procedures
		5.2	Print drawing elements and evaluate presentation
		5.3	Evaluate work and identify areas for improvement
		5.4	Close applications, perform CAD housekeeping and maintain organisational filing system

Required Skills and Knowledge

Required skills

Required skills include:

- literacy skills sufficient to read instructions for drawings work

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- using computer technologies and navigating software
- numeracy skills sufficient to interpret technical information and determine scaling and layout issues
- navigating software to:
  - manipulate drawing entities
  - modify dimension styles
  - create and use layers
  - manipulate the drawing origin
  - define and utilise symbol libraries
  - utilise grids/grid snaps and object snaps
  - display views at multiple scales
  - add title blocks/frame to layout a drawing for printing
  - prepare advanced drawings in plane orthogonal or equivalent
  - set up prototype drawings
  - define and extract attribute data
  - create bills of materials (BOM) utilising attribute data and third-party application software

Required knowledge

Required knowledge includes:

- general knowledge of different approaches to drawing
- awareness of copyright and intellectual property issues and legislation in relation to drawing
- environmental and occupational health and safety (OHS) issues associated with the tools and materials used for drawing
- quality assurance procedures
- CAD program capabilities and processes

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria required skills and knowledge range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to use CAD software to produce graphics commonly used in drafting work.
Critical aspects for assessment and evidence required to demonstrate competency in this	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required

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unit	knowledge, and be capable of applying the competency in new and different situations and contexts. Specifically the candidate must be able to: • work within typical site/teamwork structures and methods • apply worksite communication procedures • comply with organisational policies and procedures, including quality requirements • participate in work meetings • comply with quality requirements • use industry terminology • apply appropriate safety procedures • identify drawing work requirements and determine appropriate software functions and features • identify features and uses of CAD software used in detail and design drafting • access and use computing equipment and CAD software functions to produce drawing elements.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with drafting or other units requiring the exercise of the skills and knowledge covered by this unit.

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Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways, including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Range Statement

CAD software	CAD software may include: • AutoCAD • Inventor • Revitt • Solidworks • ProSteel • XSteel • other programs
Key features	Key features may include: • 2-D • 3-D modelling • built-in specifications • file import/export • save • undo • scale
Specific drawing outcomes	Specific drawing outcomes may include • 2-D • 3-D modelling • drawings for specific engineering applications • orthographic/isometric/perspectives/schematics
Basic drawing elements	Basic drawing elements may include: • points, line angles, circles, arcs, planes, figures

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	and solids • squares, rectangles and triangles • bisected lines and dividing lines • polygon, ellipse, spline, dimension and hatch
Editing and transfer tools and methods	Editing and transfer tools and methods may include: • delete, fillet, chamfer, erase, trim/extend, break, undo and redo commands • zooming and panning • moving, copying, rotating and mirroring • polar and rectangular duplication • object snaps • dimensions • selecting entities • dividing • scaling • measuring • grouping

Unit Sector(s)

Drawing, drafting and design

Custom Content Section

Not applicable.

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MEM30032A Produce basic engineering drawings

Modification History

Release 1 - New unit of competency

Unit Descriptor

This unit of competency covers producing drawings or similar graphical representations where the critical dimensions and associated tolerances and design specifications are predetermined.

Application of the Unit

This unit applies to any of the full range of engineering disciplines. All work is carried out under supervision and all specifications, dimensions and tolerances are predetermined. The unit covers application of introductory drafting skills to select and apply drawing protocols.

Manual drafting or computer-aided design (CAD) drawing equipment may be used.

If CAD skills are required, MEM30031A Operate computer-aided design (CAD) system to produce basic drawing elements, should be selected.

Drawings are completed to Australian Standard (AS) 1100.101–1992 Technical drawing – General principles.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of

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performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Identify drawing requirements	1.1	Identify information requirements for work and obtain all relevant job requirements and design specifications in accordance with workplace procedures
		1.2	Identify, interpret and analyse drawing requirements, specifications and relevant workplace information
		1.3	Interpret and apply industry terminology for drawing work
		1.4	Confirm communication practices required during drawing work
		1.5	Estimate time requirements for completing work
2	Select drawing features	2.1	Set up drawing list or register
		2.2	Determine level of detail and numbers of drawings required for work
		2.3	Plan presentation and layout, and determine drawing sheets, text style and size, and scales, appropriate for drawing work
		2.4	Identify features and applications of line types and thicknesses and select for drawing work
		2.5	Establish datums and dimensions
3	Prepare and detail drawings	3.1	Prepare drawings in plane orthogonal, isometric projection or equivalent
		3.2	Detail drawings in third angle projection, including auxiliary views, sections and assemblies
		3.3	Draw sections through engineering components incorporating correct use of cutting plane symbols and conventions

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		3.4	Include appropriate symbols for limits and fits, surface texture and geometric tolerances
		3.5	Resolve problems in consultation with a supervisor
		3.6	Check drawing compliance with work instructions and specifications
4	Select physical dimensions and produce engineering parts list	4.1	Where required, select components and/or materials from supplier/manufacturer catalogues using predetermined design specifications
		4.2	Produce an engineering parts list in accordance with workplace procedures
5	Complete drawing documentation	5.1	Obtain approval for drawings and/or parts list
		5.2	Store approved drawings and/or parts lists
		5.3	Catalogue and issue drawing and documentation in accordance with workplace procedures

Required Skills and Knowledge

Required skills

Required skills include:

- correctly using and maintaining equipment, including CAD
- manual drafting, filing and printing
- reading and interpreting specifications
- communicating with supervisor to confirm work requirements and outcomes
- visualising components
- preparing a drawing in plane orthogonal, isometric projection or equivalent
- determining drawing protocols required to complete drawing to industry standard
- selecting and locating text to support presentation
- establishing datums and dimensions for drawings
- drawing sections through an engineering component incorporating correct use of cutting plane symbols and conventions

Required knowledge

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Required knowledge includes:

- drafting media, including cartridge paper, tracing paper, drafting film and plain printing paper
- layout conventions
- effective use of blank space, location of notes and symbols
- sectioning
- overview of graphical techniques
- assembly drawings and explosion drawings
- schematics/line drawings, graphs and pictorials
- standard engineering drawing symbols, references and terminology
- application of surface finish symbols to drawings
- uses of different scales in industry applications
- uses and types of line weights
- uses and types of drawing sheets
- type of information provided with drawings

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria required skills and knowledge range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to produce basic engineering drawings to AS 1100.101–1992 Technical drawing – General principles.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. Specifically the candidate must be able to: • work within typical site/teamwork structures and methods • apply worksite communication procedures • comply with organisational policies and procedures, including quality requirements • participate in work meetings • comply with quality requirements • use industry terminology

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	• apply appropriate safety procedures • produce drawings in orthogonal and isometric projection to AS 1100.101–1992 Technical drawing – General principles • produce drawings in third angle projection, including auxiliary views, sections and assemblies • include all details, symbols and notation.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with producing basic engineering graphics, or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways, including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Range Statement

Specifications	Specifications may be obtained from: • design information • customer

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	• ideas • concepts/expectations/requirements • sketches • preliminary layouts
Drawings	Drawings may include: • plans • diagrams • charts
Consultation	Consultation may include • reference to appropriate personnel, including technical supervisors, manufacturers, suppliers, contractors and customers
Engineering parts list	Engineering parts list may include: • part name • description of part • material specification or part number • quantities • other details, as required
Issued drawings	Issued drawings may include: • hard copy • photographic, slide or transparency form, including presentation as a single drawing and/or with other drawings • support documentation as a package

Unit Sector(s)

Drawing, drafting and design

Custom Content Section

Not applicable.

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MEM30033A Use computer-aided design (CAD) to create and display 3-D models

Modification History

Release 1 - New unit of competency

Unit Descriptor

This unit of competency covers using a computer-aided design (CAD) program to produce and plot basic 3-D view drawings.

Application of the Unit

This unit applies to the production of 3-D models using CAD software and associated equipment. This will include the use of region and solid modelling techniques, section views and pre-drawn library files. Work also includes extraction of properties and application of basic rendering techniques.

All work is conducted under supervision.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Pre-Requisites

MEM30031A	Operate computer-aided design (CAD) system to produce basic drawing elements

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of

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performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Confirm drawing requirements	1.1	Confirm purpose, scope and information and presentation requirements for drawing
		1.2	Identify, interpret and analyse available information relevant to project and work requirements, and identify and address further information needs
		1.3	Identify computing equipment and software used in the organisation
		1.4	Identify work flow and procedures for work supervision and confirm communication requirements through project
		1.5	Examine requirements for presentation of drawings
2	Create and display 3-D views	2.1	Set up a 3-D environment on the screen to allow multiple viewing
		2.2	Create 3-D views on the screen by manipulation of drawing planes and insertion of 3-D geometric shapes
		2.3	Draw on any plane of the 3-D view
		2.4	Use editing functions to modify 3-D geometric shapes in creating 3-D views
		2.5	Produce wire line, surface and solid face displays in isometric, perspective and orthographic projections
3	Detail 3-D model	3.1	Extract the mass and surface area of a given solid model made from a nominated material
		3.2	Apply basic rendering techniques to render solid model to a specified set of criteria
4	Save completed	4.1	Save file in an appropriate format to enable retrieval and

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drawing file in various formats		use in a CAD system
	4.2	Save file in other formats to enable retrieval in other software applications

Required Skills and Knowledge

Required skills

Required skills include:

- reading and interpreting engineering specifications
- organising information
- using computer and peripherals
- using CAD program
- saving 3-D modes in various file formats
- preparing drawings in plane orthogonal, isometric projection or equivalent

Required knowledge

Required knowledge includes:

- region modelling techniques
- solid modelling techniques
- development of sectioned models
- use of cutting plane
- use of cross hatching
- use of pre-drawn library files and primitives to produce a 3-D model
- use of third level software to produce 3-D models
- how to extract mass and area properties
- how to extract area properties from region models
- application of basic rendering techniques to a 3-D model

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria required skills and knowledge range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to use CAD to create and display 3-D models.

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Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. Specifically the candidate must be able to: • work within typical site/teamwork structures and methods • apply worksite communication procedures • comply with organisational policies and procedures, including quality requirements • participate in work meetings • comply with quality requirements • use industry terminology • apply appropriate safety procedures • identify modelling work requirements and determine appropriate software functions and features • apply CAD functions to produce a rendered 3-D model to Australian Standard (AS) 1100.101–1992 Technical drawing – General principles.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with using CAD to create and display 3-D models or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways, including direct observation, supervisor's reports, project work,

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	samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Range Statement

Multiple viewing	Multiple viewing includes: • top views • front and side views • general 3-D view
3-D geometric shapes	3-D geometric shapes may include: • arcs and lines • spheres • cones • cylinders • boxes

Unit Sector(s)

Drawing, drafting and design

Custom Content Section

Not applicable.

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MSS402001 Apply competitive systems and practices

Modification History

Release 1 - Supersedes and is equivalent to MSS402001A Apply competitive systems and practices

Application

This unit of competency covers the skills and knowledge required to implement basic improvement practices within an organisation using competitive systems and practices. The unit focuses on bringing together the basic concepts and the holistic application of these basic concepts and processes to operations. It would typically be carried out working as part of a team.

This unit applies to an individual in an organisation that has embarked on competitive systems and practices. The unit covers the skills and knowledge required to contribute to the competitive systems and practices processes and assumes that they are to be used within the scope of the individual's job and authority.

This unit requires the application of skills associated with planning and organising an individual's own role within the competitive systems and practices framework.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the Performance criteria describe the performance needed to

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essential outcomes.		demonstrate achievement of the element.	
1	**Identify own place in the value chain**	1.1	Identify customers relevant to own work and their needs/requirements.
		1.2	Identify suppliers for own work.
		1.3	Identify value contributions along the chain.
		1.4	Identify and recommend methods of increasing own contribution to the value chain.
2	**Improve the product and process value**	2.1	Identify customer features/benefits in the product and process.
		2.2	Identify aspects of product and process which contribute to customer features/benefits.
		2.3	Identify aspects of product and process which do not contribute to customer benefits/features.
		2.4	Recommend methods of reducing waste and increasing features/benefits.
3	**Use competitive systems and practices**	3.1	Identify competitive systems and practices used in organisation and own work area.
		3.2	Apply practices appropriate for the job or process.
		3.3	Monitor the job/process and make adjustments to improve it in accordance with procedures.
		3.4	Identify own skill requirements and seek skill development, if required.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Competitive systems and practices include one or more of:

- lean operations
- agile operations
- preventative and predictive maintenance approaches
- statistical process control systems, including six sigma and three sigma
- Just in Time (JIT), kanban and other pull-related operations control systems
- supply, value, and demand chain monitoring and analysis
- 5S
- continuous improvement (kaizen)
- breakthrough improvement (kaizen blitz)
- cause/effect diagrams
- overall equipment effectiveness (OEE)
- takt time
- process mapping
- problem solving
- run charts
- standard procedures
- current reality tree.

Customers include one or more of:

- internal or external customers and should be sufficiently close to the individual's work as to be easily identifiable
- final customers used as the basis for the identification of value and waste.

Suppliers include one or more of:

- internal suppliers
- external suppliers sufficiently close to the individual's work as to be easily identifiable.

Procedures (written, verbal, visual, computer based, etc.) include one or more of:

- work instructions
- standard operating procedures (SOPs)
- safe work method statements
- formulas/recipes
- batch sheets
- temporary instructions

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- any similar instructions provided for the smooth running of the plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402001A Apply competitive systems and practices

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402001 Apply competitive systems and practices

Modification History

Release 1 - Supersedes and is equivalent to MSS402001A Apply competitive systems and practices

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability to always apply competitive systems and practices to their own job to:

- identify own place in the value chain relevant to their job
- use competitive systems and practices tools and thinking
- recommend improvements in product and/or process.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision, including:

- customer requirements and their role in fulfilling them
- the value chain for products they make and their place in it
- identification of muda (waste) and its reduction.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace
  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include the application of competitive systems and practice in own workplace
  - will typically include the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.
- Assessment should occur in operational workplace situations.

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- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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MSS402020 Apply quick changeover procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402020A Apply quick changeover procedures

Application

This unit of competency covers the skills and knowledge required to apply quick changeover procedures in an organisation implementing competitive systems and practices.

This unit applies to individuals in an organisation which is implementing competitive systems and practices and is pursuing quick changeover as one of its competitive operations tools. The unit can apply to quick changeovers of equipment, processes, batches or product type. It requires the application of skills associated with applying quick changeover procedures, including the planning and organising of own work, identifying problems and making suggestions for improvement of procedures.

Particular technical skills may also be required in some operations sectors and for some jobs. These skills should be gained from the Training Package relevant to the individual's industry and occupation.

This unit may not be applicable to a totally continuous operation producing only the one product, or simultaneous range of products. The unit is also not applicable to a maintenance/PVI shutdown as experienced by continuous process manufacturers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

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Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	**Prepare for changeover**	1.1	Determine when changeover will be required.
		1.2	Review plans and instructions for quick changeover.
		1.3	Identify role of others in quick changeover.
		1.4	Obtain all required tools/parts/materials for changeover.
		1.5	Organise process and tools/parts/materials ready for changeover.
2	**Make quick changeover**	2.1	Plan changeover according to quick changeover principles.
		2.2	Liaise and work with relevant people in quick changeover.
		2.3	Complete changeover according to procedures.
		2.4	Check output meets specification.
		2.5	Debrief with all relevant stakeholders.
		2.6	Note any steps which cause a problem.
		2.7	Recommend changes to problematic steps.
3	**Improve work health and safety (WHS)**	3.1	Identify hazards to self or others in all steps/actions.
		3.2	Determine risks from each hazard.
		3.3	Identify actions which may be performed in a more ergonomic manner.
		3.4	Recommend changes to improve WHS.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

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Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Competitive systems and practices include one or more of:

- lean operations
- agile operations
- preventative and predictive maintenance approaches
- monitoring and data gathering systems, such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Materials Resource Planning (MRP) and proprietary systems
- statistical process control systems, including six sigma and three sigma
- Just in Time (JIT), kanban and other pull-related operations control systems
- supply, value, and demand chain monitoring and analysis
- 5S
- continuous improvement (kaizen)
- breakthrough improvement (kaizen blitz)
- cause/effect diagrams
- overall equipment effectiveness (OEE)
- takt time
- process mapping
- problem solving
- run charts
- standard procedures
- current reality tree.

Changeover may include one or more of:

- an exchange of equipment (often dies or tools (traditional))
- a change between products/batches or between campaigns or processes. It may be any quantum change to produce a different product or undertake a different process.

Set-up can be divided into two types:

- internal set-up (requires work to stop, work that can be done only when the machine or process is not actively engaged in production, computers etc. need to be reset and restarted)
- external set-up (work can continue during the changeover, work

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	can be done concurrently with the machine or process performing production duties).
Set-up time includes:	• the work time required to change over a machine or process from one item or operation to the next item or operation.
Procedures (written, verbal, visual, computer based, etc.) include one or more of:	• work instructions • standard operating procedures (SOPs) • safe work method statements • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402020A Apply quick changeover procedures

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402020 Apply quick changeover procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402020A Apply quick changeover procedures

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability, for three (3) or more quick changeovers, to:

- identify the scope and equipment to be used in a quick changeover implemented in their own workplace
- plan and complete changeover
- identify problems in quick changeovers
- contribute suggestions for improvement.

Knowledge Evidence

- Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision and to solve routine problems, including knowledge of:
- principles of quick changeover, including:
  - setting of target time for changeover
  - conversion of internal set-up time to external set-up time, where appropriate
  - simplification of changeover steps
  - monitoring and continuous improvement of changeovers
- purpose and requirements of changeover
- minimisation of changeover waste (e.g. scrap and energy)
- quality requirements for products and purposes
- relevant operational procedures
- health, safety and environment (HSE) principles relevant to own job.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace

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  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include actual quick changeovers, the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.
- Assessment should occur in operational workplace situations. Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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MSS402021 Apply Just in Time procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402021A Apply Just in Time procedures

Application

This unit of competency covers the skills and knowledge required to work in an organisation implementing and/or utilising Just in Time (JIT) procedures.

This unit applies to an individual working in an organisation following JIT who will need to follow procedures which are specific to JIT, such as the controlled flow of material (e.g. the use of kanban and elimination of waste). This will involve the individual in the application of the pull system to their job and the authorisation of product/material flows in accordance with procedures and their level of authority.

This unit requires the application of skills associated with planning and organising and self-management to deliver product on demand using necessary tools, equipment and processes to meet production requirements. The unit also requires an ability to recognise and act on problems that may interfere with meeting production demands.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Respond to indicator of demand**	1.1	Identify pull of product through work role.
		1.2	Recognise indicator of flow authorisation.
		1.3	Identify production or service required.
2	**Make products or deliver service to demand**	2.1	Make product or deliver service as required by ticket.
		2.2	Identify any factors likely to prevent demand being satisfied in own work or work of the team.
		2.3	Take action in accordance with procedures.
3	**Update demand information as required**	3.1	Record information on ticket to procedures, as required.
		3.2	Facilitate operation of flow authorisation as part of work.
4	**Recommend improvements**	4.1	Examine the operation of the JIT system as it relates to own work.
		4.2	Identify areas for improvement.
		4.3	Identify any additional personal skill requirements to implement JIT procedures.
		4.4	Recommend improvements.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

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Competitive systems and practices include one or more of:	• lean operations • agile operations • preventative and predictive maintenance approaches • statistical process control systems, including six sigma and three sigma • Just in Time (JIT), kanban and other pull-related operations control systems • supply, value, and demand chain monitoring and analysis • 5S • continuous improvement (kaizen) • breakthrough improvement (kaizen blitz) • cause/effect diagrams • overall equipment effectiveness (OEE) • takt time • process mapping • problem solving • run charts • standard procedures • current reality tree.
JIT requires availability:	• precisely when the service, product or operation is to be produced or undertaken • in the right quantity and at the right quality.
Product includes one or more of:	• a physical product • a supporting utility service, such as water, gas and power • some other service (e.g. cranes and forklifts).
Indicator of demand includes one or more of:	• kanban bin, ticket or similar • some other indicator of demand pull which authorises production or movement of an item (in some plants, this may also include authorisation using SCADA software).
Procedures (written, verbal, visual, computer based, etc.) include one or more of:	• work instructions • standard operating procedures (SOPs) • safe work method statements • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the

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plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402021A Apply Just in Time procedures

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402021 Apply Just in Time procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402021A Apply Just in Time procedures

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability, for one (1) or more JIT procedures, to:

- identify the indicators of demand and the flow authorisation system in their own workplace
- relate products and services supplied by suppliers and customers to the flow authorisation system
- interpret received indicators of demand correctly for quantity, quality and time of delivery
- contribute suggestions for improvement.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision, including:

- JIT methods relevant to own job
- relevant indicator of demands for own job
- own role in flow authorisation
- faults and other issues that may threaten the JIT delivery of own product or service
- procedures for recommending improvements.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace
  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include JIT procedures in own workplace

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    - will typically include the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.
- Assessment should occur in operational workplace situations. Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
    - relevant VET or other qualification/Statement of Attainment AND/OR
    - relevant workplace experience
- Currency can be demonstrated through:
    - performing the competency being assessed as part of current employment OR
    - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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MSS402040 Apply 5S procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402040A Apply 5S procedures

Release 2. Duplicated performance Criteria removed. Equivalent outcome.

Application

This unit of competency covers the skills and knowledge required by an individual to apply 5S procedures to their own job and work area. The unit assumes the individual has a particular job and an allocated work area and that processes in the work area are known by the individual.

This unit applies to an individual in an organisation who works in an operational position as part of production, maintenance, logistics, etc. The unit can also apply to individuals in other organisations who have a discrete role and responsibility for individually managed processes.

This unit applies where an organisation has decided to embark on a competitive systems and practices strategy and as part of this has adopted the philosophy of 5S as one of the tools to improve performance. The employee needs to apply 5S to their job and work area and maintain the housekeeping and other standards set by 5S.

This unit requires the application of skills associated with planning and organising, problem solving and self-management, in order to identify and implement 5S housekeeping practices.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Sort needed items from unneeded**	1.1	Identify all items in the work area.
		1.2	Sort items to achieve deliverables and value expected by downstream and final customers.
		1.3	Sort items required for regulatory or other required purposes.
		1.4	Place any non-essential item in an appropriate place other than the workplace.
		1.5	Regularly check that only essential items are in the work area.
2	**Set the workplace in order**	2.1	Identify the best location for each essential item.
		2.2	Place each essential item in its assigned location.
		2.3	After use immediately return each essential item to its assigned location.
		2.4	Regularly check that each essential item is in its assigned location.
3	**Shine the work area**	3.1	Keep the work area clean and tidy at all times.
		3.2	Conduct regular housekeeping activities during shift.
		3.3	Ensure the work area is neat, clean and tidy at both beginning and end of shift.
4	**Standardise activities**	4.1	Follow procedures.
		4.2	Follow checklists for activities, where available.
		4.3	Keep the work area to specified standard.
5	**Sustain the 5S system**	5.1	Clean up after completion of job and before commencing next job or end of shift.
		5.2	Identify situations where compliance to standards is unlikely and take actions specified in procedures.
		5.3	Inspect work area regularly for compliance to specified standard.
		5.4	Recommend improvements to lift the level of

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compliance in the workplace.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Competitive systems and practices include one or more of:

- lean operations
- agile operations
- preventative and predictive maintenance approaches
- statistical process control systems, including six sigma and three sigma
- Just in Time (JIT), kanban and other pull-related operations control systems
- supply, value, and demand chain monitoring and analysis
- 5S
- continuous improvement (kaizen)
- breakthrough improvement (kaizen blitz)
- cause/effect diagrams
- overall equipment effectiveness (OEE)
- takt time
- process mapping
- problem solving
- run charts
- standard procedures
- current reality tree.

5S includes all of:

- sort
- set in order
- shine
- standardise
- sustain.

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Sort includes all of:	• separating necessary from unnecessary items (equipment and supplies) • keeping only what is absolutely necessary for the work processes that comprise the job • disposing of (or relocating) all other items.
Set in order includes all of:	• assigning required equipment and materials appropriate locations in the work area • consideration of frequency of use, ergonomics and work health and safety (WHS) • provision of facilities to maintain the locations.
Shine includes one or more of:	• keeping the work area clean at all times which should be carried out to a regular daily schedule against allowed time, usually at the end of the day or of a particular process • keeping work area organised • noting any signs of wear, damage, leakage, safety risks or other issues that require immediate attention.
Best location includes one or more of:	• changes to the layout of furniture • arrangement of equipment • provision of services • location of personnel.
Standardising includes one or more of:	• activities that help maintain the order and the housekeeping standards • using procedures and checklists developed from a procedure.
Sustain includes one or more of:	• making sure that daily activities are completed every day regardless of circumstance • cleaning up after a job • undertaking inspections, including: • informal inspections carried out often, at least weekly • formal inspections carried out at least monthly • generating continuous improvement actions from daily activities • following up specific actions to generate continuous improvement.

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Items in work area include one or more of:	• tools • jigs/fixtures • materials/components • plant and equipment • manuals • personal items (e.g. bags, lunch boxes and posters) • safety equipment and personal protective equipment (PPE) • other items which happen to be in the work area.
Procedures (written, verbal, visual, computer based, etc.) include one or more of:	• work instructions • standard operating procedures (SOPs) • safe work method statements • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402040A Apply 5S procedures

Release 2. Equivalent to MSS402040 Apply 5S procedures Release 1.

Links

The MSS Sustainability Companion Volume implementation Guides are available from VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402040 Apply 5S procedures

Modification History

Release 1. Supersedes and is equivalent to MSS402040A Apply 5S procedures

Release 2. Duplicated performance Criteria removed. Equivalent outcome.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability, in one (1) or more allocated areas, to:

- implement and sustain 5S in own workplace
- identify own tasks and responsibilities
- contribute suggestions for improvement.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision, including:

- purpose of 5S in the workplace
- meaning and application of 5S steps to own workplace and job
- principles of efficient workplace organisation
- identifying waste (muda)
- procedures for recommending improvements.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace
  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include the application of 5S procedures in a work area where 5S has not previously been undertaken, or, demonstration of sustaining 5S principles in a work area that has already undergone prior 5S procedures
  - will typically include the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.

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- Assessment should occur in operational workplace situations. Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

The MSS Sustainability Companion Volume implementation Guides are available from VETNet: - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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MSS402080 Undertake root cause analysis

Modification History

Release 1. Supersedes and is equivalent to MSS402080A Undertake root cause analysis

Application

This unit of competency covers the skills and knowledge required to undertake root cause analysis (RCA). This unit also covers the competencies needed by operators to contribute to an advanced maintenance strategy using RCA coupled with diagrams and charts.

This unit applies to individuals working in an organisation that is applying competitive systems and practices strategies. The unit applies to the formal problem solving to root cause that the individual must undertake in their own work area or where the individual contributes to problem solving to root cause as part of a team.

This unit requires an ability to seek and apply information from a variety of sources in order to inform RCAs. Initiative and enterprise is also required to identify quick fix and permanent solutions to problems.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1	**Recognise problems**	1.1	Identify features or occurrences indicative of a problem.
		1.2	Use appropriate tools, techniques and charts to define the problem.
2	**Implement quick fix**	2.1	Recommend a quick fix within the scope of competency and authority.
		2.2	Use technology or processes relevant to the problem to implement quick fix.
3	**Determine root cause**	3.1	Identify a range of possible causes.
		3.2	Gather data and other information to eliminate or confirm possible causes.
		3.3	Use available data and information to link causes and effects.
		3.4	Seek assistance to obtain additional information if problem is beyond own competency/authority.
		3.5	Identify root cause.
4	**Develop permanent solution**	4.1	Identify a range of methods to eliminate the root cause or break the cause tree.
		4.2	Select the most appropriate solution.
		4.3	Liaise with relevant people.
		4.4	Recommend or implement solution within the limits of competency and authority.
		4.5	Monitor impact of solution and make further recommendations, as required.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

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Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Competitive systems and practices include one or more of:

- lean operations
- agile operations
- preventative and predictive maintenance approaches
- statistical process control systems, including six sigma and three sigma
- Just in Time (JIT), kanban and other pull-related operations control systems
- supply, value, and demand chain monitoring and analysis
- 5S
- continuous improvement (kaizen)
- breakthrough improvement (kaizen blitz)
- cause/effect diagrams
- overall equipment effectiveness (OEE)
- takt time
- process mapping
- problem solving
- run charts
- standard procedures
- current reality tree.

Problems include one or more of:

- variation to normal plant or equipment operation
- unplanned or non-conforming process or operations outcomes
- out of specification products
- excess scrap
- accidents and emergencies
- regulatory breaches
- customer returns and complaints
- reduction or loss of sales.

Techniques/charts include one or more of:

- control charts
- Pareto charts
- run charts

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- flow charts
- cause and effect diagrams
- tree diagrams
- 5 Whys analysis
- organisation specified/mandated methods.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402080A Undertake root cause analysis

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402080 Undertake root cause analysis

Modification History

Release 1. Supersedes and is equivalent to MSS402080A Undertake root cause analysis

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability, for one (1) or more problems, to:

- undertake problem identification
- use appropriate processes to achieve root cause identification
- recommend solutions and implementation procedures to problems within own area
- monitor implementation of solutions.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision, including:

- methodology of root cause analysis, including:
  - difference between quick fix and root cause elimination
  - breaking of causal tree
- indicators of problems and variances to normal operation
- relevant analysis tools (e.g. Pareto charts, 5 Whys).

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace
  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include a root cause analysis in own workplace
  - will typically include the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.

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- Assessment should occur in operational workplace situations.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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MSS402081 Contribute to the application of a proactive maintenance strategy

Modification History

Release 1. Supersedes and is equivalent to MSS402081A Contribute to the application of a proactive maintenance strategy

Application

This unit of competency covers the skills and knowledge required by an individual to make a positive contribution to proactive maintenance strategies, including actions that contribute to equipment uptime and overall equipment effectiveness (OEE). This unit applies in an organisation which is following a predictive, preventative or reliability-centred maintenance strategy and which requires commitment from all employees. The employee should 'own' their equipment/plant and take an active part in the implementation of the strategy within the scope of their authority.

This unit requires the application of skills associated with accessing and maintaining equipment/plant documentation. It also requires problem solving, initiative and enterprise to continually monitor and maintain operational performance of equipment/plant used in work role.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Competitive systems and practices

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the Performance criteria describe the performance needed to

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essential outcomes.		demonstrate achievement of the element.	
1	**Maintain equipment/plant**	1.1	Keep equipment/plant within area of responsibility clean.
		1.2	Ensure equipment/plant is serviced and adjusted, as required, in accordance with procedures and own level of responsibility.
		1.3	Access manufacturer manuals and specifications, where required, to expand knowledge on the maintenance of equipment/plant.
		1.4	Access and update documentation on equipment/plant operation and maintenance in accordance with workplace procedures.
2	**Monitor operation of equipment/plant**	2.1	Regularly check key conditions of the equipment/plant as defined in workplace procedures.
		2.2	Regularly check equipment/plant OEE.
		2.3	Note any deviation from conditions specified in procedures.
3	**Identify deviations and patterns**	3.1	Identify any previous occurrences of a deviation.
		3.2	Identify any related deviations which have occurred.
		3.3	Identify any unusual occurrence which may be related to a deviation.
4	**Take action appropriate to competency and authority on deviation**	4.1	Liaise with relevant people regarding the deviation and the solution.
		4.2	Implement solution and/or assist with the implementation of the solution, as appropriate.

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

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Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Competitive systems and practices include one or more of:	• lean operations • agile operations • preventative and predictive maintenance approaches • statistical process control systems, including six sigma and three sigma • Just in Time (JIT), kanban and other pull-related operations control systems • supply, value, and demand chain monitoring and analysis • 5S • continuous improvement (kaizen) • breakthrough improvement (kaizen blitz) • cause/effect diagrams • OEE • takt time • process mapping • problem solving • run charts • standard procedures • current reality tree.
Uptime includes one or more of:	• the overall availability of the plant • the inverse of downtime or the unavailability of the plant • the fraction, percentage or time the plant is available for production.
Procedures (written, verbal, visual, computer based, etc.) include one or any combination of:	• work instructions • standard operating procedures (SOPs) • safe work method statements • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the

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plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS402081A Contribute to the application of a proactive maintenance strategy

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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Assessment Requirements for MSS402081 Contribute to the application of a proactive maintenance strategy

Modification History

Release 1. Supersedes and is equivalent to MSS402081A Contribute to the application of a proactive maintenance strategy

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria, and include the ability to monitor equipment/plant in one (1) or more areas, and to:

- maintain the equipment/plant to the required standard
- identify deviations in OEE requiring action
- take the action required by the procedures.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job role sufficient to fulfil their job role under routine only supervision, including:

- interpretation of trends or other non-random variation
- determining OEE (availability x performance x quality rate) and uptime metrics
- principles of operation of plant/equipment and factors likely to cause deviations in performance
- identifying deviations requiring action
- appropriate actions for dealing with deviations.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operation of the workplace
  - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include the application of proactive maintenance in own workplace
  - will typically include the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems.

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- Assessment should occur in operational workplace situations.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
  - relevant VET or other qualification/Statement of Attainment AND/OR
  - relevant workplace experience
- Currency can be demonstrated through:
  - performing the competency being assessed as part of current employment OR
  - having consulted with an organisation providing relevant environmental monitoring, management or technology services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998

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PMASUP410 Develop plant documentation

Modification History

Release 1. Supersedes and is equivalent to PMASUP410B Develop plant documentation

Application

This unit of competency covers the skills and knowledge required to develop, establish and evaluate plant documentation in response to identified information requirements. Examples of information requirements include workplace documents for the introduction of new systems, processes, equipment and record keeping requirements.

This unit of competency applies to senior technicians, team leaders and supervisors, or those in similar roles who are required to apply in-depth knowledge of process and plant to in order to investigate the need for new plant documentation, determine operating principles and best practice in consultation with others, draft and validate the plant documentation, and communicate and distribute the new/amended documentation.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Support

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.
1	**Identify information need/deficiency**	1.1 Identify the need for documentation in accordance with company requirements
		1.2 Evaluate current documentation where existent

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		1.3	Define information need/deficiency
		1.4	Discuss information requirements with appropriate personnel
2	**Develop plant documentation**	2.1	Specify information need and set/prioritise objectives
		2.2	Analyse existing documentation/records in accordance with specified requirements
		2.3	Source information and determine operating principles, best practice and other content as required.
		2.4	Develop/amend documentation as a draft in accordance with specifications to standard format
		2.5	Issue documentation to appropriate personnel for review
		2.6	Edit documentation and amend in accordance with review requirements
		2.7	Complete documentation to satisfy the initial identified need/deficiency
3	**Communicate changes to plant documentation**	3.1	Explain and communicate documentation to all relevant personnel
		3.2	Distribute documentation to all appropriate personnel
		3.3	Evaluate implementation of documentation
		3.4	Amend documents, if required

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory framework

The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used, and include one or more of the following:

- legislative requirements, including work health and safety (WHS)
- industry codes of practice and guidelines
- environmental regulations and guidelines
- Australian and other standards
- licence and certification requirements

Procedures

All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, include one or more of the following:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant

Plant documentation

Plant documentation to be developed/amended includes one or more of the following:

- operating procedures
- work instructions
- incident procedures
- operating manuals
- quality manuals and procedures
- training program contents/materials

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Unit Mapping Information

Release 1. Supersedes and is equivalent to PMASUP410B Develop plant documentation

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875

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Assessment Requirements for PMASUP410 Develop plant documentation

Modification History

Release 1. Supersedes and is equivalent to PMASUP410B Develop plant documentation

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria, and include the ability to:

- review and interpret a range of relevant sources of information and select relevant content
- communicate and consult effectively with all stakeholders
- clearly convey complex/technical information in writing
- use language, structures and formats that are appropriate to information needs, the reader and organisation requirements.

Knowledge Evidence

Evidence must be provided that demonstrates knowledge of:

- principles of operation of plant/equipment
- process-specific science (e.g. physics, chemistry and biochemistry) and mathematics
- organisation procedures, including those covering:
  - information systems
  - data management
  - quality
  - safety, emergency and hazard control
  - policy/procedure development
  - document control and approvals
  - style guides and standards for documentation
  - use of internet
  - relevant standard operating procedures
- standard codes of practice relevant to developing plant documentation
- sources of information, including:
  - manufacturing specifications
  - product specifications
  - company policies and procedures
  - customer requirements
  - industry/work place codes of practice
  - state/territory work health and safety (WHS) legislation and regulations

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- ISO and other industry standards and regulations
- industry associations, networks and professional bodies.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence based on a holistic assessment of the evidence.
- The collection of performance evidence:
  - should occur over a range of situations which include typical disruptions to normal, smooth operations
  - will typically include a supervisor/third-party report focusing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
  - must include developing and/or amending at least two (2) types of plant documentation, the use of appropriate tools, equipment and safety gear requiring demonstration of preparation, operation, completion and responding to problems
  - may use industry-based simulation for part of the unit particularly where safety, lack of opportunity or significant cost is an issue.
- Assessment should occur in operational workplace situations. Where this is not possible, or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment reflecting realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Assessment in a simulated environment should use evidence collected from one or more of:
  - walk-throughs
  - pilot plant operation
  - demonstration of skills
  - industry-based case studies/scenarios
  - ‘what ifs’.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.

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- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition, the assessor or anyone acting in subject matter expert role in assessment must demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they must assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
  - relevant VET or other qualification/Statement of Attainment
  - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
  - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
  - being currently employed undertaking the type of work being assessed
  - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
  - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
  - conducting on-the-job training/assessments of the type of work being assessed
  - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875

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RIIRAI609D Establish and maintain electrical installations, reticulation and protection system

Modification History

Release	Comment
1	This unit replaces RIIQAI609A Establish and maintain electrical installations, reticulation and protection system
2	Plan and Prepare element added.
3	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit develops a participant's skills and knowledge required to establish and maintain electrical installations, reticulation and protection systems in Coal mining.

This unit is appropriate for those working in management or technical specialist roles.

No licensing, legislative or certification requirements apply to this unit at the time of publication

Unit Sector

Coal mining

Elements and Performance Criteria

1. Plan and prepare for electrical installations, reticulation and protection	1.1 Access, interpret and apply electrical installations, reticulation and protection system documentation and ensure the work activity is compliant 1.2 Obtain, read, interpret, clarify and confirm work requirements 1.3 Identify and address potential risks, hazards and environmental issues and implement control measures 1.4 Select and wear personal protective equipment appropriate for

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	work activities 1.5 Identify design/selection specifications and critical aspects of the systems from a comprehensive analysis of operating requirements 1.6 Identify systems options from an analysis of all relevant technical, operational and financial information 1.7 Select the preferred systems options on the basis of performance against specification requirements
2. Provide power supply systems for the mine site	2.1 Install, maintain, review and modify mine power supply systems 2.2 Undertake processes and procedures and ensure reliability and quality of supply taking into account transients, harmonics, over-voltages, voltage regulation, lightning and stray currents 2.3 Plan and install alternative power supply associated with mine site conditions and safety needs 2.4 Undertake processes and procedures to protect high energy sources (sub stations and transformers) through the selection and installation of switchgear and protective devices 2.5 Provide mine illumination systems and equipment 2.6 Plan and install battery and associated charging equipment 2.7 Review, audit, report and maintain all power supply systems
3. Provide electrical protection system for mine sites	3.1 Access, interpret and apply the compliance documentation requirements related to mine electrical protection system 3.2 Install and maintain the electrical protection system 3.3 Identify, isolate, rectify faults in electrical installations and verify ability of the system through recognised decision-making processes, including the use of fault level calculations, discrimination and component ratings 3.4 Apply management decision-making processes for the maintenance, examination and testing of electrical protection systems relative to mine site and safety needs 3.5 Review, modify, audit and maintain all electrical protection systems and devices
4. Provide cables from power source to point of usage	4.1 Access, interpret, apply and implement the compliance documentation requirements related to provision and use of mine cables 4.2 Identify, select and install mine cables 4.3 Identify, report and rectify mine cable faults and hazards in accordance with mine site and hazard control requirements

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	4.4 Inspect mine cables for their integrity, usage, consequence of fault/damage and previous repairs 4.5 Carry out management, inspection, application, testing, fault finding and repair
5. Provide mobile machinery and electrical apparatus	5.1 Access, interpret, clarify and apply the compliance documentation requirements related to provision and use of mobile machinery and electrical apparatus 5.2 Identify, select and install mobile machinery and electrical apparatus 5.3 Inspect, monitor, report and rectify mobile machinery and electrical apparatus faults and hazards 5.4 Carry out testing
6. Provide overall electrical services that apply to production systems	6.1 Access, interpret, clarify and apply the compliance documentation requirements related to overall electrical services that apply to production systems 6.2 Select, install, monitor and maintain mine communication systems 6.3 Select, install, monitor, modify and maintain the electrical components of the gas monitoring and detection systems 6.4 Select, install, monitor, modify and maintain control systems 6.5 Control, monitor and rectify electromagnetic interference that may affect the safe use of electrical systems and other mining equipment 6.6 Select, install, monitor, modify and maintain remote control systems on mining equipment 6.7 Select, install, monitor, modify and maintain welding equipment and energy delivery sources, including pre and post operations 6.8 Identify, control and manage hazards from electrostatic charges
7. Provide safe electrical work procedures	7.1 Access, interpret, clarify and implement the compliance documentation requirements related to safe electrical work procedures 7.2 Monitor and audit safe electrical work procedures 7.3 Determine and implement training needs

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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Assessment Requirements for RIIRAI609D Establish and maintain electrical installations, reticulation and protection system

Modification History

Release	Comment
1	This unit replaces RIIQAI609A Establish and maintain electrical installations, reticulation and protection system
2	Plan and Prepare element added.
3	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locates and applies relevant legislation, documentation, policies and procedures
- implements procedures and techniques for the safe, effective and efficient completion of the establishing and maintenance of mine electrical installations, reticulation and protection systems including:
  - accessing, interpreting and applying legislative, organisation and site requirements and procedures
  - accessing, interpreting and applying:
  - technical information
  - records and reports
  - applying the principles of electrical installations, reticulation, control and protection system theory
  - applying procedures for the evaluation of designs and installations of electrical installations, reticulation, control and protection systems at a mine in terms of safety requirements
  - applying risk management processes for the risks associated with and consequences of failure of electrical installations, reticulation, control and protection systems at a mine

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    - applying risk management processes for the risks associated with and consequences of changes to electrical installations, reticulation, control and protection systems at a mine
    - applying development procedures, for the management, operation, testing and maintenance of the mines electrical installations, reticulation, control and protection systems
    - applying procedures for the planning, coordination and documentation of work on the mines electrical installations, reticulation, control and protection systems
    - applying training needs analysis
- works effectively with others to establish and maintain mine electrical installations, reticulation and protection systems including:
    - managing people and processes
    - resolving conflict
    - coordinating human, financial and physical resources
    - developing, initiating and administering work plans
    - interpreting and applying operational performance data
    - engaging internal and external stakeholders
- demonstrates completion of the establishing and maintenance of mine electrical installations, reticulation and protection systems that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
    - identifying the relevant information and scope of the work
    - identifying the full range of specification requirements
    - identifying all aspects of mine power supply systems
    - identifying options for power supply systems, electrical protection systems, and cables from power source to point of usage

Knowledge Evidence

The candidate must demonstrate knowledge of the in establishing and maintaining electrical installations, reticulation and protection systems through:

- legislative, organisation and site requirements and procedures for;
    - inspections and reporting
    - hazards associated with high energy systems in mining
- electrical protection theory, including earthing systems, coordination and fault level calculations, step and touch potential management
- fault discrimination and fault clearance characteristics of equipment
- mining electrical protection systems, including earth continuity monitoring, earth leakage protection, earth fault current limitation and relevant standards
- typical low and high voltage switching and distribution systems on mines
- transient over-voltages, harmonics and lightning theory, hazards and protection schemes

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- mining cables, faults and consequences, cable protection systems, standards and cable repair
- classification of hazardous areas and explosion-protected electrical equipment principles, general requirements, verification, testing and standards
- automatic control system hazards, protection schemes and standards
- electromagnetic interference hazards, protection schemes and standards
- management and control of processes for change to software and hard wired based systems
- electromagnetic interference hazards, protection schemes and standards
- radio remote control systems hazards, protection schemes and standards
- safety protective devices associated with welding machines such as Voltage Reducing Devices
- the principles of electrical installations, reticulation, control and protection system theory
- the risks associated with and consequences of failure of electrical installations, reticulation, control and protection systems at a mine
- the risks associated with and consequences of changes to electrical installations, reticulation, control and protection systems at a mine

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit must be assessed in the context of this sector's work environment; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

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Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Construction	1	1 Year
	2	2 Years
Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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RIIRIS601D Establish and maintain the risk management system

Modification History

Release	Comment
1	This unit replaces RIIRI601A Establish and maintain the risk management system
2	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit describes a participant's skills and knowledge required to establish and maintain the risk management system in the Resources and Infrastructure Industries.

This unit is appropriate for those working in management roles.

No licensing, legislation or certification requirements apply to this unit at the time of publication.

Elements and Performance Criteria

1. Plan and prepare to establish the framework for the risk management system	1.1 Access, interpret and apply risk management documentation, and ensure the work activity is compliant 1.2 Develop the policy and objectives that express the organisation's commitment to risk management 1.3 Establish and implement the structure and framework 1.4 Define, allocate and document responsibilities for risk management in job descriptions and duty statements
2. Establish processes to support the risk management system	2.1 Develop, document and communicate procedures covering risk identification, assessment, treatment, communication, consultation, monitoring and review 2.2 Provide or arrange appropriate development and/or training for personnel 2.3 Identify, obtain and maintain information sources to support the system, and make them available to personnel to implement 2.4 Provide information on known and intended process changes

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	and enhancements to responsible personnel 2.5 Determine and make available organisation's criteria for assessing the acceptability of risks to responsible personnel 2.6 Obtain and provide expert advice to responsible personnel
3. Plan and facilitate the implementation of the risk management system	3.1 Plan, schedule and document the systems coverage 3.2 Monitor activities and achievement targets, and provide and focus resources to ensure the work plan is satisfied 3.3 Provide support and encouragement to those responsible for the system activities 3.4 Review and update the system work plan when changing circumstances are anticipated or occur
4. Audit the management processes	4.1 Formally audit risk management processes, including operating procedures and implementation processes, to ensure compliance and effectiveness 4.2 Respond to changed requirements disclosed during audits in a systematic and timely manner 4.3 Complete and retain risk management documentation including the reasons for and changes made to the system
5. Monitor completion of records and reports	5.1 Ensure all risk management documentation is produced and processed 5.2 Ensure all risk management documentation is maintained

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

Unit Mapping Information

RIIRIS601A Establish and maintain the risk management system

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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Assessment Requirements for RIIRIS601D Establish and maintain the risk management system

Modification History

Release	Comment
1	This unit replaces RIIRI601A Establish and maintain the risk management system
2	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locate and apply relevant documentation, policies and procedures
- demonstrates completion of the establishment and maintenance of the risk management system that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
  - reading, interpreting and applying risk management legislation to develop and maintain risk management systems
  - applying procedures for developing and maintaining procedures and policies
  - applying procedures for facilitating and documenting management planning
  - applying procedures for monitoring and deciding on changes to process
  - explaining complex risk management information to superiors/subordinates
  - applying coaching and mentoring support to supervisors who are carrying out risk management activities
  - actively encouraging the free exchange of information through consultation, using technology mediums and policies
  - preparing written reports communicating the options for managing risk, clarifying the decision and reviewing of outcomes
  - performing audits of risk management processes, recognising positive behaviours of others contributing to the management of risk, and providing direction and amendment to others and processes when the compliance is not achieved

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Knowledge Evidence

The candidate must demonstrate knowledge of establishing and maintaining risk management systems through:

- applies active listening, identifies barriers to communication and provides clarification to make meaning
- action planning methods
- actions based on cost, safety, and welfare issues
- work procedures
- risk management system reporting and recording procedures
- hazard identification, risk assessment and risk treatment processes

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit is best assessed in the context of this sector's work environment;
- where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

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Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Construction	1	1 Year
	2	2 Years
Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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RIIWHS202D Enter and work in confined spaces

Modification History

Release	Comment
1	The unit replaces RIIOHS202A Enter and work in confined spaces.
2	Editorial corrections.
3	Amended Application field.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit describes a participant's skills and knowledge required to enter and work in confined spaces in the Resources and Infrastructure Industries.

This unit is appropriate for those working in operational roles undertaking work in confined spaces.

Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and Industry sectors. Relevant information must be sourced prior to application of the unit.

Note: The terms Occupational Health and Safety (OHS) and Work Health and Safety (WHS) are equivalent and generally either can be used in the workplace. In jurisdictions where the National Model WHS Legislation has not been implemented RTOs are advised to contextualise the unit of competency by referring to the existing State/Territory OHS legislative requirements.

Elements and Performance Criteria

1 Plan and prepare for working in confined space	1.1 Access, interpret and apply procedures for confined space entry and the environmental management plan and ensure the work activity is compliant 1.2 Obtain, confirm, clarify and apply work instructions and agreed procedure 1.3 Obtain, confirm, clarify and apply safety requirements

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	1.4 Obtain and confirm authorisation (entry permit) meets regulatory requirements 1.5 Confirm the emergency response procedure is with the stand-by person and understood 1.6 Identify, obtain and implement signage and barrier requirements 1.7 Select tools and equipment for the tasks, check for serviceability and rectify or report any faults 1.8 Identify, confirm and apply the environmental protection requirements 1.9 Position rescue equipment by the entry permit
2 Work in confined space	2.1 Gain access to confined space 2.2 Ensure that the atmosphere is tested and monitored for harmful elements 2.3 Correctly apply tagging and lock-out procedures 2.4 Enter the confined space correctly 2.5 Maintain ongoing communication with the stand-by person 2.6 Comply with entry permit requirements 2.7 Monitor and adhere to allocated entry time
3 Exit confined space	3.1 Exit confined space correctly 3.2 Recover tools, equipment and materials 3.3 Conduct inspection of the confined space 3.4 Secure access to the confined space 3.5 Remove tagging and lock-out 3.6 Accurately complete confined space entry permit
4 Clean up	4.1 Clear work area and dispose of or recycle materials 4.2 Clean, check, maintain and store tools and equipment 4.3 Remove, clean and store barriers and signs

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

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Unit Mapping Information

RIIOHS202A Entering and working in confined spaces

Links

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Assessment Requirements for RIIWHS202D Enter and work in confined spaces

Modification History

Release	Comment
1	The unit replaces RIIOHS202A Enter and work in confined spaces.
2	Editorial corrections.
3	Amended Application field.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locates and applies relevant documentation, policies and procedures
- demonstrates completion of entering and working in confined spaces that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
  - obtain appropriate entry permit and instructions for performing work in confined space
  - interpreting and applying safe work method statements
  - apply tagging and lock out
  - selecting, wearing and caring for personal protective equipment applicable to all tasks and environment identified
  - entering the confined space
  - using atmospheric monitoring devices prior to entering the confined space
  - working in the confined space
  - using atmospheric monitoring devices during confined space activity
  - applying safe materials handling methods
  - exiting the confined space
  - remove tagging and lock out

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Knowledge Evidence

The candidate must demonstrate knowledge of enter and work in confined spaces through:

- identifying areas that constitute confined spaces
- complying with site and equipment safety requirements
- complying with the entry and exit procedures, risks and regulations
- types of air contaminants and toxic gases
- identifying the limitations of breathing apparatus
- identifying equipment types, characteristics, technical capabilities and limitations
- complying with site isolation and site control responsibilities and authorities
- locations of safety data sheets (SDS) information and application
- using confined space and Industry terminology

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit is best assessed in the context of this sector's work environment;
- where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

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Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Construction	1	1 Year
	2	2 Years
Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

Links

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RIIWHS204D Work safely at heights

Modification History

Release	Comments
1	This unit replaces RIIOHS204A Work safely at heights.
2	Formatting corrections.
3	Inserted Application information.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit describes a participant's skills and knowledge required to work safety at heights in the Resources and Infrastructure Industries.

This unit it appropriate for those working in operational roles where they are required to perform work at heights.

Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and Industry sectors. Relevant information must be sourced prior to application of the unit.

Note: The terms Occupational Health and Safety (OHS) and Work Health and Safety (WHS) are equivalent and generally either can be used in the workplace. In jurisdictions where the National Model WHS Legislation has not been implemented RTOs are advised to contextualise the unit of competency by referring to the existing State/Territory OHS legislative requirements.

Elements and Performance Criteria

1. Identify work requirements	1.1 Access, interpret and apply height safety procedures and ensure the work activity is compliant 1.2 Inspect site to determine layout and physical condition, condition of structures, prevailing weather conditions, equipment requirements and potential hazards

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	1.3 Adhere to WHS requirements 1.4 Identify, select and check safety equipment for serviceability 1.5 Identify, manage and report potential risks and hazards
2. Identify work procedures and instructions	2.1 Consult with authorised personnel to select materials, tools and equipment and check for serviceability 2.2 Select, wear and care for personal protective equipment 2.3 Inspect/install fall protection and perimeter protection equipment 2.4 Identify approved methods of moving tools and equipment to work area and minimise potential hazards associated with tools at heights 2.5 Ensure safety system has been installed correctly 2.6 Select and install appropriate signs and barricades
3. Access and install equipment	3.1 Consult with authorised personnel to ensure anchor fall protection and associated equipment is correctly fitted and adjusted 3.2 Ensure all required equipment is installed 3.3 Use recommended methods to access work area for people, tools and equipment 3.4 Locate tools and materials to eliminate or minimise the risk of items being knocked down
4. Perform work at heights	4.1 Check access from ground to work area and ensure it is safe 4.2 Keep fall equipment in place and adjusted appropriately for movement during work 4.3 Undertake manual handling of materials and equipment 4.4 Locate materials and equipment ensuring that they are safely secured and distributed 4.5 Check safety system periodically for compliance 4.6 Monitor risk control measures to ensure that they are effective and appropriate 4.7 Reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations
5. Clean up work area	5.1 Consult with authorised personnel to ensure safety system is dismantled and removed 5.2 Clear work area and dispose of or recycle materials 5.3 Clean, check, maintain and store tools and equipment

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

Unit Mapping Information

RIIOHS204A Working safely at heights

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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Assessment Requirements for RIIWHS204D Work safely at heights

Modification History

Release	Comments
1	This unit replaces RIIOHS204A Work safely at heights.
2	Formatting corrections.
3	Inserted Application information.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locates and applies relevant documentation, policies and procedures
- demonstrates completion of working safely at heights that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
  - accessing, interpreting and applying technical and safety information for working at heights
  - assessing hazards and risk associated with working at heights and implement control methods
  - selecting wearing and caring for personal protective equipment
  - identifying required safety systems including fall protection and associated equipment
  - checking that fitting, adjusting and anchoring of fall protection and associated equipment is correct
  - performing work safely at heights

Knowledge Evidence

The candidate must demonstrate knowledge of the following when working safely at heights:

- names and functions of equipment, components and materials

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- complying with equipment manufacturer's instructions and specifications
- safe shifting and handling of tools and materials
- adhering to statutory and regulatory authority requirements
- the nature of work undertaken at heights
- complying with heights safety systems
- the processes of providing for safe working practices
- using safety equipment/systems and considerations to facilitate working safely at heights
- complying with safe work methods

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit is best assessed in the context of this sector's work environment;
- where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Construction	1	1 Year
	2	2 Years

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Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

Links

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RIIWHS205D Control traffic with stop-slow bat

Modification History

Release	Comment
1	The unit replaces RIIOHS205A Control traffic with stop-slow bat.
2	Editorial corrections; Performance Criteria numbering for element 1 corrected.
3	Amended Application field.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Application

This unit describes a participant's skills and knowledge required to control traffic with stop-slow bat in the Resources and Infrastructure Industries.

This unit is appropriate for those working in operational roles.

Licensing, legislative, regulatory and certification requirements that apply to this unit can vary between states, territories, and Industry sectors. Relevant information must be sourced prior to application of the unit.

Note: The terms Occupational Health and Safety (OHS) and Work Health and Safety (WHS) are equivalent and generally either can be used in the workplace. In jurisdictions where the National Model WHS Legislation has not been implemented RTOs are advised to contextualise the unit of competency by referring to the existing State/Territory OHS legislative requirements.

Elements and Performance Criteria

1. Plan and prepare	1.1 Access, interpret and apply site traffic plan procedures and ensure the work activity is compliant 1.2 Obtain, confirm, clarify and apply work instructions 1.3 Obtain, confirm, clarify and apply safety requirements 1.4 Identify, obtain and implement signage and devices 1.5 Select tools and equipment, check for serviceability and rectify or report any faults

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	1.6 Identify, confirm, clarify and apply environmental protection requirements
2. Control traffic	2.1 Position or confirm temporary traffic signs and barriers 2.2 Direct traffic correctly 2.3 Control vehicles and pedestrian traffic and ensure safety 2.4 Monitor traffic, make adjustments for changing conditions and position waiting vehicles for smooth traffic flow 2.5 Use hand held stop/slow bats 2.6 Use visibly clear and unobstructed hand signals 2.7 Report traffic offenders
3. Operate communication devices	3.1 Adjust communication device controls for optimum reception/transmission results 3.2 Transmit messages clearly and concisely 3.3 Maintain communication device power supply 3.4 Check communications contact after nominated period of non-contact
4. Clean up	4.1 Remove or cover signs and devices sequentially to provide warning to motorists during shutdown 4.2 Clean, check, maintain and store tools and equipment

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit. Further information is available in the Resources and Infrastructure Industry Training Package Companion Volume.

Unit Mapping Information

RIIOHS205A Control traffic with stop-slow bat

Links

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Assessment Requirements for RIIWHS205D Control traffic with stop-slow bat

Modification History

Release	Comment
1	The unit replaces RIIOHS205A Control traffic with stop-slow bat.
2	Editorial corrections; Performance Criteria numbering for element 1 corrected.
3	Amended Application field.
4	Required frequency and volume of evidence amended in Performance evidence. Substantial amendments made in Assessment Conditions field, including: references to Industry Sectors, assessor and subject matter expert experience requirements, how assessment should be conducted and what it should confirm.

Performance Evidence

Evidence is required to be collected that demonstrates a candidate's competency in this unit. Evidence must be relevant to the roles within this sector's work operations and satisfy all of the requirements of the performance criteria of this unit and include evidence that the candidate:

- locates and applies relevant documentation, policies and procedures
- demonstrates completion of controlling traffic with a stop-slow bat that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including:
  - reading and interpreting the work instruction and planning work activity accordingly
  - positioning signage and barriers
  - directing and controlling vehicle traffic
  - directing and controlling pedestrian traffic
  - communicating to drivers and pedestrians clearly using hand signals
  - using approved communication devices such as hand held radios or phones to transmit message and report of offenders
  - removing or covering signs after work completion

Knowledge Evidence

The candidate must demonstrate knowledge of controlling traffic with stop-slow bat through:

- site and equipment safety requirements

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- traffic controlling requirements and procedures
- complying with traffic management plans
- erecting traffic control signage and barricades
- communication device operations
- determine equipment types, characteristics, technical capabilities and limitations
- operational and maintenance procedures for equipment
- detailing site isolation and traffic control responsibilities and authorities
- describing the effects of travel speed and vehicle mass on stopping distances
- interpreting and implementing safe work method statement

Assessment Conditions

- An assessor of this unit must satisfy the requirements of the NVR/AQTF or their successors; and Industry regulations for certification and licensing; and,
- this unit is best assessed in the context of this sector's work environment;
- where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills; and,
- this unit must be assessed in compliance with relevant legislation/regulation and using policies, procedures, processes and operational manuals directly related to the industry sector for which it is being assessed; and,
- assessment may be conducted in conjunction with the assessment of other Units of Competency; and,
- assessment must confirm consistent performance can be applied in a range of relevant workplace circumstances; and,
- assessors must demonstrate the performance evidence, and knowledge evidence as outlined in this Unit of Competency, and through the minimum years of current* work experience specified below in an Industry sector relevant to the outcomes of the unit; or,
- where the assessor does not meet experience requirements a co-assessment or partnership arrangement must exist between the qualified assessor and an Industry subject matter expert. The Industry subject matter expert should hold the unit being assessed (or an equivalent unit) and/or demonstrate equivalence of skills and knowledge at the unit level. An Industry technical expert must also demonstrate skills and knowledge from the minimum years of current work experience specified below in the Industry sector, including time spent in roles related to the unit being assessed; and,
- assessor and Industry subject matter expert requirements differ depending on the Australian Qualifications Framework Level (AQF) of the qualification being assessed and/or Industry Sector as follows:

Industry sector	AQF** Level	Required assessor or Industry subject matter expert experience
Drilling, Metalliferous Mining, Coal	1	1 Year

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Mining, Extractive (Quarrying) and Civil Construction	2	2 Years
Drilling, Coal Mining and Extractive (Quarrying)	3-6	3 Years
Metalliferous Mining and Civil Construction	3-6	5 Years
Other sectors	Where this Unit is being assessed outside of the Resources and Infrastructure Sectors assessor and/or Industry subject matter expert experience should be in-line with industry standards for the sector in which it is being assessed and where no Industry standard is specified should comply with any relevant regulation.	

*Assessors can demonstrate current work experience through employment within Industry in a role relevant to the outcomes of the Unit; or, for external assessors this can be demonstrated through exposure to Industry by conducting frequent site assessments across various locations.

**Where a unit is being delivered outside of a Qualification the first numeric character in the Unit code should be considered to indicate the AQF level

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272

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TLILIC0003 Licence to operate a forklift truck

Modification History

Release 1. This is a release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to operate a forklift truck safely in accordance with all relevant legislative requirements. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

Forklift truck means a powered industrial truck equipped with lifting media made up of a mast and an elevating load carriage to which is attached a pair of fork arms or other attachments that can be raised 900 mm or more above the ground, but does not include a pedestrian-operated truck or a pallet truck.

A person performing this work is required to hold a forklift truck High Risk Work Licence (HRWL).

This unit requires a person operating a forklift truck to:

- plan for the work/task
- prepare for the work/task
- perform work/task
- pack up

Licensing/Regulatory Information

Legislative and regulatory requirements are applicable to this unit of competency.

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) Regulations and meets Commonwealth, State and Territory HRWL requirements.

The National Assessment Instrument (NAI) is the mandated assessment for the HRWL to operate the relevant licencing class as detailed in this unit.

Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

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Unit Sector

Not applicable

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan work/task	**1.1** Task requirements are identified from work orders or equivalent and confirmed with relevant people and site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is assessed to determine suitability for operational use of forklift truck in accordance with workplace procedures
	1.3 Suitability of forklift truck and attachment working load limit (WLL) is determined for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Working area is inspected and appropriate paths for operating the forklift truck and moving and placing load/s in work area are assessed and managed in accordance with workplace procedures
	1.5 Hazard and risk control measures are identified and reported to relevant person/s in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed in accordance with workplace procedures
	1.7 Appropriate communication procedures are identified with relevant people in accordance with workplace procedures
	1.8 All work is confirmed to ensure coverage of work/task requirements for the relevant work area is in accordance with workplace procedures

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2 Prepare for work/task	**2.1**	Consultation with workplace person/s is maintained to ensure workplan is clear and consistent with site requirements in accordance with safe work procedures
	2.2	Weather and work environmental conditions are assessed to determine any impact on forklift truck operations in accordance with manufacturer requirements and safe work procedures
	2.3	Risk control measures for hazards identified are checked for implementation in accordance with safe work procedures
	2.4	Forklift truck is accessed in a safe manner in accordance with manufacturer requirements and workplace procedures
	2.5	Forklift truck logbook is checked in accordance with manufacturer, regulatory requirements and safe work procedures
	2.6	Pre-start checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with safe work procedures and manufacturer requirements
	2.7	Forklift truck is set up correctly with any relevant attachments as per work plan in accordance with relevant manufacturer requirements including data plate and safe work procedures
	2.8	Operational checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer requirements and safe work procedures
	2.9	Hazard and risk control measures are checked for implementation and communicated to people in the work area in accordance with safe work procedures
3 Perform work/task	**3.1**	Weight and positioning of load is assessed to ensure compliance with forklift truck data plate requirements and in accordance with safe work procedures

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	3.2	Forklift truck is operated safely in accordance with manufacturer requirements and safe work procedures
	3.3	Loads are monitored constantly when lifting, moving, lowering and placing to ensure stability of load and avoidance of hazards in accordance with safe work procedures
	3.4	Unplanned and unsafe situations are responded to in accordance with safe work procedures
	3.5	Loads are picked up, transported and placed using all forklift truck movements in accordance with safe work procedures
	3.6	Forklift truck is parked, switched off and isolated appropriately in accordance with manufacturer requirements and safe work procedures
4 Pack Up	**4.1**	Forklift truck shutdown procedures are carried out in accordance with manufacturer requirements and safe work procedures
	4.2	Forklift truck is secured to prevent unauthorised access/use in accordance with safe work procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC2001 Licence to operate a forklift truck

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Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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Assessment Requirements for TLILIC0003 Licence to operate a forklift truck

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements and performance criteria on at least one occasion and include:

- applying safe operating procedures for a forklift truck including:
  - maintaining safe operating speed
  - travelling with load lowered to an appropriate height for the terrain, operating surface and visibility in relation to direction of travel
- applying relevant forklift truck manufacturer requirements and data plate information and approved modifications to attachments fitted are in accordance with manufacturer requirements
- carrying out pre-start checks, including visual inspection which must include:
  - battery charge as required by manufacturer requirements
  - checking and interpreting data plate/s are relevant to the attachment and the forklift truck
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - document evidence of damage
  - engine / mechanical fluid level checks including fuel as required by manufacturer requirements
  - ensuring availability of correct forklift truck logbook and updating records as required
  - ensuring forklift truck tynes or other attachment/s are securely fitted
  - ensuring seat and mirrors are adjusted appropriately and seat belt is functional
  - fluid leaks
  - lights are working effectively
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - wheels and tyres for damage/correct inflation if applicable
- conducting and applying risk and hazard assessment strategies including:
  - insufficient lighting
  - other specific hazards including dangerous goods
  - overhead hazards and fixed structures, roof beams and doorways
  - restricted and poorly ventilated areas

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    - surface suitability based on forklift truck and task requirements
    - the risk of collision with people, moving plant and fixed structures
    - weather conditions
- complying with Commonwealth, State and Territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation, regulations safe work and workplace procedures
- conducting operational checks, which must ensure:
    - all controls are located, identified and tested for functionality
    - all hydraulic functions operated to maximum extension and ensuring attachment (if fitted) movements and control functions are smooth and comply with operating requirements
    - hazard warning systems (e.g. reversing beepers, lights and horns) are functional
    - recording and maintaining accurate information relating to forklift truck operations
    - safety devices as fitted
    - start-up is in accordance with manufacturer requirements
    - steering, transmission and brake functions comply with operating requirements
    - there are no unusual noises
- confirming and following traffic management plan procedures relevant to their role in the work area
- conducting relevant procedures for refuelling and isolating fuel/power source as per manufacturer requirements using appropriate PPE
- determining relevant lifting attachment to perform work/task
- determining lift requirements including:
    - positioning of unusually balanced/shaped loads
    - centre of gravity
    - dynamic nature of load
    - tyne/attachment positioning
    - weight
- ensuring risk control measures within the work area are effective as per workplace procedures
- identifying, isolating and tagging out defective equipment and reporting to authorised person/s
- interpreting and confirming relevant documentation, workplace instructions, safety information, emergency procedures for the work task and relevant area
- interpreting workplace procedures in relation to various environmental conditions
- maintaining communication with other workplace personnel through using worksite procedures including:
    - audible and visual warning devices
    - signage
    - two-way radio
    - verbal instructions
    - written instructions
- maintaining three points of contact whilst accessing and egressing forklift truck and ensuring

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rungs / steps are free of hazards
- operating and monitoring safe forklift truck operations using minimum 250kg dynamic and non-dynamic loads that include:
  - aligning tynes/attachment to load
  - carrying out a lift to 75% of the maximum height
  - conducting trial lift to ensure forklift truck and load are stable, and load is safe to move
  - correctly using horns and mirrors in workplace
  - correctly positioning and using an observer to assist when operating with a load that may restrict vision or be placed out of vision of the operator
  - driving applicable to conditions and moving loads safely
  - driving a forklift truck safely with load in forward and reverse, while maintaining visibility through an obstacle course including:
    - an 'S' bend with a minimum 90 degrees left and right turn
    - ensuring load/s remains stable through pick up, transport and placement
    - forklift truck speed is appropriate to load and surroundings
    - lowering dynamic and non-dynamic loads to appropriate height for travel in forward and reverse
  - picking up, driving, manoeuvring and placing dynamic and non-dynamic loads safely at various heights within a compliant racking system
  - picking up, driving, manoeuvring and placing dynamic and non-dynamic loads safely into/onto an elevated, flat, stable area
  - tilting mast (or forks if applicable) to ensure balance of load
  - using gluts/dunnage appropriately and lowering load safely
  - using tilt and side shift (where fitted) safely to manoeuvre dynamic and non-dynamic loads into allocated space
- reporting to relevant person/s on site risk control measures that are not in place or are deficient
- setting up an exclusion zone
- securely parking forklift truck and isolating in appropriate position including:
  - minimising possible access by unauthorised person/s
  - tynes/attachment lowered to required position in accordance with manufacturer requirements
  - park brake applied
  - switching off, isolating fuel/power source and removing key according to workplace procedures
- shutting down a forklift truck in accordance with manufacturer requirements and workplace procedures

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- Australian and industry standards, codes of practice and guidelines to safely operate a forklift truck
- communication procedures including:
  - audible and visual warning devices
  - hand signals
  - questioning techniques
  - signage
  - traffic warning systems
  - two-way radio
  - written instructions
- forklift truck characteristics and capabilities, manufacturer requirements and instructions for any attachments
- impact of the following on the operation of the forklift truck including:
  - failure/loss of control including brakes and steering
  - failure of equipment during forklift truck operations
  - forklift truck instability causes including:
    - deterioration of ground condition
    - overloading
    - pick up and placement of load
    - irregular loads
  - operating on ramps and uneven surfaces and in restricted spaces
  - use of forklift truck data plate and attachment data plate and appropriate methodology to determine weight of a load is appropriate for forklift truck and any attachment if fitted including the estimation or determination from:
    - labels on the actual load
    - markings on the actual load
    - paperwork such as consignment notes, running sheets and weighbridge dockets
    - weighing a carton and calculating load
- manufacturer requirements, instructions and operator's manual
- problems, and appropriate response procedures to unplanned and/or unsafe environmental conditions including:
  - wind
  - lightning
  - water/ice impacted surface/ground
  - rain
  - extreme heat
  - Ultra violet (UV) exposure
- problems and equipment faults, and implementing appropriate response procedures to unplanned and/or unsafe situations including:
  - lock out and tag out procedures
- relevant procedures for refuelling and recharging forklift truck using appropriate PPE

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including:

- gas bottle
- connecting battery to charger and disconnecting battery from charger and reconnecting to forklift truck
- refuelling

- procedures for recording, reporting and maintaining workplace records and information
- risk assessment process including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- safe use and compliance of different types of attachments including:
  - bale clamps
  - carpet spike for carpet rolls
  - drum carrier
  - jib attachment
  - paper roll clamps
  - personnel work platforms
  - rotators
  - slippers/fork extensions on tynes
- suitability and lifting capability of the attachment to be used
- shut down procedures for a forklift truck in accordance with manufacturer requirements
- traffic management plan procedures and requirements
- typical routine problems encountered operating a forklift truck and associated equipment, and adjustments required for correction
- workplace procedures including work plan which may be verbal, documented/written, or electronically generated
- work area operating surface suitability including issues with:
  - backfilled ground
  - bitumen (damaged, cracked)
  - concrete (damaged, cracked)
  - hard compacted soil
  - potholes
  - railway tracks
  - rough uneven or difficult terrain including sloping surfaces, uneven surfaces, steel decks and grates
  - soft soils
  - trench covers
- Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety

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and Health (OSH) requirements, safe work and workplace procedures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

- Simulators must not be used in the assessment of this unit of competency.

Resources for assessment must include access to:

- a suitable forklift truck that complies with AS 2359 Powered industrial trucks and is in a safe/serviceable condition in accordance with manufacturer requirements
- associated equipment for forklift truck operations
- suitable dynamic and non-dynamic loads
- suitable compliant racking system
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including:
  - approved codes of practice and relevant guidance material
  - relevant Australian technical standards
  - manufacturer guidelines (instructions, requirements or checklists), relevant industry standards and operating procedures (where applicable)

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLIS2004 Install and maintain rail bonding systems

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit involves the skills and knowledge required to install and maintain all types of temporary and permanent bonds and bonding cables in use in the Australian rail system, in accordance with safeworking and regulatory requirements, and workplace procedures.

This includes planning the installation and maintenance, preparing the worksite, installing and maintaining the bonds and bonding cables, and conducting all required post-installation activities as a non-electrical rail safety worker.

People achieving competence in this unit will need to fulfil the applicable state/territory legislated rail safety requirements and to comply with relevant codes of practice, rail industry standards and/or guidelines.

Work is performed under some supervision, generally within a team environment.

Rail bonding systems involve the application of routine operational principles and procedures when fixing cable across a break or joint in one rail, or between two rails to provide a path for traction return current or track-circuits, as part of workplace activities across a variety of operational contexts within the Australian rail system.

Operators of mechanised equipment must have undertaken training and, where appropriate, hold the relevant licence, permit or certificate and be recognised as competent for the class of machinery being used.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Not applicable.

Competency Field

S – Construction and Installation

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Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan the installation and maintenance of the relevant bonding systems	1.1 Works order including drawings, plans and material lists is received/accessed, analysed and confirmed as required by site inspection
	1.2 Work is assessed and prioritised in accordance with works scheduled
	1.3 Site relevant electrical permits are accessed and/or obtained as required
	1.4 Hazards are identified, risks are assessed and control measures are implemented
	1.5 Resources including personnel, plant, equipment and tools are identified and scheduled
	1.6 Liaison and communication issues with other personnel, authorities, clients and landowners are resolved
2 Prepare the worksite	2.1 Personnel participating in the task, including plant operators and contractors, are fully briefed
	2.2 Site preparation is completed in accordance with works order
	2.3 Specialist testing and earth equipment is inspected as required and replaced if defective
	2.4 Road signs, barriers and warning devices are positioned as required
	2.5 Safeworking practices are observed on or about the running track/line
3 Install and maintain bonding system cables	3.1 Systems and circuits are isolated as required, proved safe to work on in accordance with work plan and electrical permits are issued/accepted/relinquished as required

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	3.2 Cable and surrounds, including rail and other surfaces, are prepared to appropriate specifications
	3.3 Bonds are attached in accordance with specifications
	3.4 Joint and termination procedures are carried out in accordance with authorised work procedures
	3.5 Continuity testing procedures are carried out as required
	3.6 System is commissioned following visual inspection and the completion of other testing
4 Conduct post-operational activities	4.1 Worksite is rehabilitated in accordance with workplace procedures
	4.2 Work is completed in an agreed time and with minimum waste
	4.3 Notifications, records and documentation for updating system data are completed

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLIS2004A Install and maintain rail bonding systems.

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Assessment Requirements for TLIS2004 Install and maintain rail bonding systems

Modification History

Release 1. This is the first release of this unit of competency in the TLI Transport and Logistics Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on **at least three** separate occasions and include:

- applying relevant safeworking and workplace procedures
- communicating effectively with others
- completing relevant documentation
- guiding operators of plant and equipment and using appropriate signals when installing and maintaining cables
- identifying job hazards and taking required action to minimise, control or eliminate identified hazards
- implementing contingency plans
- interpreting and following operational instructions and prioritising work
- modifying activities depending on operational contingencies, risk situations and environments
- monitoring work activities in terms of planned schedule
- organising activities in accordance with workplace procedures
- reading and interpreting relevant technical data, drawings, instructions and manuals
- reporting and/or rectifying identified problems, faults or malfunctions, in accordance with workplace procedures
- selecting and using relevant equipment and tools
- working collaboratively with others
- working systematically with required attention to detail without injury to self or others, or damage to goods or equipment.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- applicable state/territory legislated rail safety requirements, relevant codes of practice and/or guidelines
- characteristics, capabilities and uses of various types of cables
- circuits for signalling and communications systems awareness as a non-electrical rail safety worker
- current capacities, inductance and capacitance, protection systems and devices
- electrical hazard awareness including voltage and current transformation, voltage drop, cable and traction systems
- joint test and fault identification/location workplace procedures
- problems that may occur when installing and maintaining rail bonding systems and action that can be taken to report or resolve these problems
- rail industry standards for installing and maintaining rail bonding systems
- switching operation, isolation and access permit procedures
- testing and commissioning procedures, including testing and earth/rail connecting conductors
- traction earthing systems and bonding systems
- work health and safety (WHS)/occupational health and safety (OHS) and environmental procedures and regulations
- workplace documentation and records systems
- workplace procedures for installing and maintaining rail bonding systems for non-electrical rail safety workers.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the *Standards for Registered Training Organisations* current at the time of assessment.

Assessment must occur in workplace operational situations or, where this is not available, in simulated workplace operational situations that replicate rail corridor workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment include:

- a range of relevant exercises, case studies and/or simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, regulations, rail industry standards, codes of practice and operation manuals.

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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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UEPOPS202 Apply quality systems to work

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Application

This unit involves the skills and knowledge required to apply a quality assurance system to work.

Quality control is a process to ensure that significant variations in quality are kept to a minimum. Quality control in a power generation facility will focus on a set of procedures intended to ensure that personnel, plant and equipment operate smoothly and efficiently.

Competency in this unit requires the ability to plan and prepare quality procedures, conduct quality system practices and initiate changes to quality systems. Individuals will, in general, work as an operator in a power generation facility.

No licensing, legislative or certification requirements apply from this unit at the time of publication.

Note: Workplace practice

The application of the skills and knowledge described in this unit may require a licence or training permit to practice in the workplace where work is carried out on gas and electrical installations. Additional conditions may apply under state and territory legislative and regulatory licensing requirements.

Pre-requisite Unit

There are no prerequisite units.

Competency Field

Operations

Unit Sector

Electricity generation

Elements and Performance Criteria

ELEMENTS **PERFORMANCE CRITERIA**

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan and prepare to work with quality systems	**1.1** Quality procedures are identified from quality system and Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) regulations, in accordance with workplace procedures
	1.2 Performance objectives are identified, in accordance with workplace procedures and Quality Management System (QMS)
	1.3 Work plan is structured, in accordance with workplace procedures and site requirements, to ensure quality standards are achieved
2 Conduct quality system practices	**2.1** Quality assurance processes and procedures are implemented, in accordance with workplace procedures and manufacturers' recommendations
	2.2 Work is monitored against quality standards and sustainable energy principles, and are clarified with appropriate personnel, in accordance with workplace procedures
	2.3 Allocated work tasks are completed, in accordance with workplace procedures and quality assurance requirements
3 Initiate changes to quality systems	**3.1** Improvements to quality assurance procedures are identified by analysis of system outcomes, in accordance with workplace procedures and quality assurance requirements
	3.2 Extent of proposed changes to quality procedures are investigated, in accordance with workplace procedures and quality assurance
	3.3 Proposed improvements are negotiated and confirmed with appropriate personnel, in accordance with workplace procedures and quality assurance requirements

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

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Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEPOPS202B Apply quality systems to work.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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Assessment Requirements for UEPOPS202 Apply quality systems to work

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- applying continuous improvement techniques
- applying Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) legislated requirements including:
  - emergency procedures
  - risk control measures
  - safe working practices
- communicating with personnel
- complying with legislation, industry standards, codes of practice and regulations
- contributing to quality control audits
- identifying quality procedural change requirements
- improving quality control procedures
- initiating changes to quality assurance processes and procedures
- planning and preparing for quality control
- using recording procedures for documenting
- utilising sustainable energy principles and practices
- working with quality assurance procedures, tools and techniques

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- continuous improvement
- continuous improvement techniques
- legislation, industry standards, codes of practice and regulations
- principles of sustainable energy practice
- procedural quality change requirements

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- quality control
- quality control audits including improvement implementation
- Quality Management System (QMS) tools and techniques
- WHS/OHS including:
  - emergency procedures
  - risk control measures
  - safe working practices
- workplace documentation
- workplace policies and procedures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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UEPOPS337 Maintain quality systems within the team

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Application

This unit involves the skills and knowledge required to oversee compliance of the maintenance quality system, using performance indicators, within a team environment.

Quality control is a process through which an organisation seeks to ensure that significant variations in quality are kept to a minimum. Quality control in power generation facilities will focus on a set of procedures intended to ensure that personnel, plant and equipment operate efficiently.

Competency in this unit requires the ability to formulate team aspects of the quality system and facilitate team quality systems. Individuals will, in general, work as an operator, in a power generation facility.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Workplace practice

The application of the skills and knowledge described in this unit may require a licence or training permit to practice in the workplace where work is carried out on gas and electrical installations. Additional conditions may apply under state and territory legislative and regulatory licensing requirements.

Pre-requisite Unit

UEPOPS202 Apply quality systems to work

Competency Field

Operations

Unit Sector

Electricity generation

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Formulate team aspects of the quality system	**1.1** Quality assurance requirements for team are identified or modified from an analysis of workplace needs, in accordance with workplace procedures
	1.2 Team performance indicators, are referred to appropriate personnel for approval in accordance with workplace procedures
	1.3 Quality system documentation is obtained, and modified, in accordance with workplace procedures and quality assurance standards
2 Facilitate team quality systems	**2.1** Team discussion on quality system is undertaken, in accordance with workplace procedures
	2.2 Quality system is monitored, in accordance with workplace procedures and quality assurance standards
	2.3 Failure to satisfy Key Performance Indicators (KPIs) is recorded and investigated, in accordance with workplace procedures and quality assurance standards
	2.4 Quality system is reviewed with the team to ensure currency and relevance, in accordance with workplace procedures and quality assurance standards
	2.5 Quality system records for the team are maintained, in accordance with workplace procedures and quality assurance standards

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UEPOPS337B Maintain quality systems within the team.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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Assessment Requirements for UEPOPS337 Maintain quality systems within the team

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- applying Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) regulations including:
  - emergency procedures
  - risk control measures
  - safe working practices
- communicating with personnel
- implementing legislation, industry standards, codes of practice and regulations
- maintaining records and documentation
- monitoring and reviewing quality system
- recommending and implementing workplace quality improvements
- undertaking performance reporting including Key Performance Indicators (KPIs) and key result areas
- using continuous improvement and quality management tools and techniques
- working with quality standards

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- industry quality standards
- legislation, industry standards, codes of practice and regulations
- Quality Management System (QMS) tools and continuous improvement techniques including key result areas and key performance indicators
- records and documentation
- WHS/OHS legislated requirements including:
  - emergency procedures
  - safe working practices

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- risk control measures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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UEPOPS416 Monitor implementation of quality control for production and maintenance

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Application

This unit involves the skills and knowledge required to monitor the implementation of production and maintenance quality control procedures at a power generation facility.

Quality control is a process used to ensure variations in quality are kept to a minimum. Quality control in a power generation facility will focus on a set of processes and procedures intended to ensure that personnel, plant and equipment operate smoothly and efficiently.

Competency in this unit requires the ability to plan for quality control, monitor quality control and complete all documentation. Individuals will, in general, work as an operator, in a power generation facility.

Power generation plant operators are typically trained and authorised to isolate, prepare plant and issue permits to work.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Note: Workplace practice

The application of the skills and knowledge described in this unit may require a licence or training permit to practice in the workplace where work is carried out on gas and electrical installations. Additional conditions may apply under state and territory legislative and regulatory licensing requirements.

Pre-requisite Unit

UEPOPS337 Maintain quality systems within the team

Competency Field

Operations

Unit Sector

Electricity generation

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan for quality control	**1.1** Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) standards, legislative requirements, industry standards, codes of practice, manufacturers' specifications, environmental obligations and workplace procedures are identified, applied and monitored
	1.2 Quality control parameters are established for power generation production and maintenance, in accordance with workplace procedures
	1.3 Quality control process improvement techniques are used, in accordance with workplace procedures, in the identification and resolution of quality variances in power generation
2 Monitor quality control	**2.1** Monitoring equipment is checked for correct calibration, and environmental conditions are confirmed, in accordance with workplace procedures, to ensure reliability and accuracy of test results
	2.2 Quality control procedures for production and maintenance in power generation is monitored, in accordance with workplace procedures
	2.3 Deviation and fault data is collected and reported, in accordance with workplace procedures
3 Complete documentation	**3.1** Calibration records of test equipment is maintained, in accordance with workplace procedures
	3.2 Documentation is completed, in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work

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environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEPOPS416B Monitor the implementation of the enterprise's production maintenance quality control procedures.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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Assessment Requirements for UEPOPS416 Monitor implementation of quality control for production and maintenance

Modification History

Release 1. This is the first release of this unit of competency in the UEP Generation Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and includes:

- applying Work, Health and Safety (WHS)/Occupational Health and Safety (OHS) requirements including:
  - emergency procedures
  - risk control measures
  - safe working practices
- communicating with personnel
- completing documentation
- conducting checks and inspections
- implementing legislation, industry standards, codes of practice and regulations
- interpreting manufacturers' specifications and manuals
- monitoring quality control processes and techniques
- planning quality control
- undertaking data analysis
- working with quality control procedures, processes and techniques

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all the requirements of the elements, performance criteria and range of conditions and includes knowledge of:

- data analysis
- inspection techniques
- legislation, industry standards, codes of practice and regulations
- manufacturers' specifications and manuals
- power generation plant and equipment, its location and operating parameters
- quality control procedures, processes and techniques

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- typical arrangements of power production plant
- WHS/OHS legislated requirements including:
  - emergency procedures
  - risk control measures
  - safe working practices
- workplace documentation
- workplace policies and procedures

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations. Where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=1715b9fa-e7bd-441c-bb8d-cf22c9c825a8

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UETTDRIS43 Perform low voltage field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to perform low voltage (LV) field switching operation to a given schedule in the electricity supply industry (ESI).

It includes the operation of circuit breaking and isolating devices from a switching schedule, paralleling in accordance with the switching schedule, communicating with the switching control officer or electrical control officer, isolating the electrical equipment and the line or worksite, as well as proving the work area is de-energised and earthed, issuing/accepting electrical permits and returning the affected circuits to service.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRTP26 Install transmission structures and associated hardware
UETTDRTP27 Maintain transmission structures and associated hardware
UETTDRTP29 Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDRDP12 Maintain overhead energised low voltage conductors and cables
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRIS56 Install and maintain low voltage overhead services
Rail Traction Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRRT21 Install traction overhead wiring systems
UETTDRRT22 Maintain traction overhead wiring systems
UETTDRRT23 Install rail traction bonds
UETTDRRT27 Install overhead traction components and equipment
UETTDRRT28 Maintain overhead traction components and equipment
Distribution Cable Jointing Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDRCJ21 Lay ESI electrical cables
UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables
UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS55 Install and maintain low voltage underground services

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Electrical Pathway Group

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for LV field switching to a given schedule	**1.1** Switching and work schedules, plans, drawings, workplace procedures and material lists are received, analysed and confirmed by site inspection, as required
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS), environmental and workplace procedures for LV switching are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with

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		relevant personnel and in accordance with workplace procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.6	Relevant authority to perform work is obtained in accordance with requirements and workplace procedures
	1.7	Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out LV field switching to a given schedule	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace procedures
	2.2	Requirements for lifting and/or climbing and/or working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.3	LV field switching to a given schedule are applied to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Communications with switching control officer, or equivalent, are established and maintained during the isolation operation in accordance with workplace procedures
	2.5	Electrical equipment and associated circuits to be switched, including paralleling, are isolated and proved de-energised using appropriate devices and earthed, as required, in accordance with workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance

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		with workplace procedures
3 Complete LV field switching to a given schedule	**3.1**	Completed work is checked against switching schedule for compliance and anomalies are reported in accordance with workplace procedures
	3.2	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.3	Worksite is cleaned and made safe and surplus materials are returned to storage or disposed of in accordance with workplace procedures
	3.4	Plant, equipment and tools are cleaned, checked and returned to service in accordance with workplace procedures
	3.5	Relevant work permits are signed off in accordance with workplace procedures
	3.6	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS43A Perform low voltage field switching operation to a given schedule.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS43 Perform low voltage field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing low voltage (LV) field switching operation to a given schedule using all of the following:
  - approvals/clearances
  - access authority/permits
- using at least two (2) of the following:
  - voltage detectors
  - polarity testers
  - phase rotation indicators
- using at least one (1) of the following:
  - LV links
  - LV bridges
  - LV fuses
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to system switching
- requirements for the use of manuals, system diagrams/plans and drawings, including:
  - types, characteristics and capabilities of electrical apparatus
  - use, characteristics and capabilities of specialised tools and testing equipment
  - LV network interconnectors for alternate sources of supply and possible back-feed

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- procedures for obtaining correct LV switching authorisation, including:
  - identification of hazards, assessing and controlling risks
  - safety procedures and precautions
  - safe approach distances (SAD)
  - responsibilities and protocols
  - identifying switching resources
  - procedures for obtaining electrical access permits/authorities
  - requirements for team switching
  - procedures for coordination of operations
- techniques in LV system switching, including:
  - isolation procedures and proving dead
  - pre-switching checks
  - switching operational procedures
  - emergency fault procedures
  - energisation procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing low voltage field switching operation to a given schedule
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS44 Perform HV field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to perform high voltage (HV) field switching operation to a given schedule in the electricity supply industry (ESI).

It includes the operation of circuit breakers, isolating devices, communicating with switching control officer or electrical control officer, isolating electrical equipment and line or worksite. It also includes proving area is de-energised and applying earthing equipment, issuing/accepting electrical permits and returning affected line and electrical equipment to service.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

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UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRTP26 Install transmission structures and associated hardware
UETTDRTP27 Maintain transmission structures and associated hardware
UETTDRTP29 Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDRDP12 Maintain overhead energised low voltage conductors and cables
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRIS56 Install and maintain low voltage overhead services
Rail Traction Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRRT21 Install traction overhead wiring systems
UETTDRRT22 Maintain traction overhead wiring systems
UETTDRRT23 Install rail traction bonds
UETTDRRT27 Install overhead traction components and equipment
UETTDRRT28 Maintain overhead traction components and equipment
Distribution Cable Jointing Pathway Group
UETTDRCJ21 Lay ESI electrical cables
UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables
UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS55 Install and maintain low voltage underground services
Electrical Pathway Group
UEENEEE137A Document and apply measures to control OHS risks associated with

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electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to undertake HV switching procedures to a given schedule	**1.1** Switching and work schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS), environmental and workplace procedures for HV switching are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures

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	1.5	Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.6	Relevant authority is obtained to perform work in accordance with workplace procedures
	1.7	Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out HV switching procedures to a given schedule	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace procedures
	2.2	Requirements for lifting and/or climbing and/or working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.3	HV switching procedures to a given schedule are applied to ensure completion in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Communications with switching control officer are established and maintained throughout the isolation operation in accordance with workplace procedures
	2.5	Electrical equipment, associated circuits, line/network or worksite to be switched, including paralleling, is isolated and proved de-energised using appropriate devices and earthed, where required, in accordance with workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Relevant permits are prepared and issued in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance

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		with workplace procedures
3 Complete HV switching procedures to a given schedule	**3.1**	Completed switching is checked against work schedule and anomalies are reported in accordance with workplace procedures
	3.2	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.3	Worksite is rehabilitated, cleaned and made safe in accordance with workplace procedures
	3.4	Plant, equipment and tools are cleaned, checked and returned to service in accordance with workplace procedures
	3.5	Relevant work permits are signed off, safety devices removed and system re-energised and returned to service in accordance with workplace procedures
	3.6	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS44A Perform HV field switching operation to a given schedule.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS44 Perform HV field switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- performing high voltage (HV) field switching operation to a given schedule using the following:
  - approvals/clearances
  - access permits
- using all of the following:
  - HV operating sticks
  - HV operating earths
  - HV detectors
- using at least one (1) of the following specialist tools:
  - HV phasing sticks
  - HV ground mounted equipment isolating handles and earths
- operating switchgear with at least two (2) of the following:
  - HV links
  - air break switches
  - fuses
- using at least three (3) of the following:
  - reclosers
  - ring main units
  - circuit breakers
  - isolators
  - earth switches
  - sectionalisers
- dealing with unplanned events on at least one (1) occasion.

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Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
- requirements for the use of manuals, system diagrams/plans and drawings, including:
  - types, characteristics and capabilities of electrical apparatus
  - use, characteristics and capabilities of specialised tools and testing equipment
  - network interconnectors source of possible backfeed
- role of the HV switching operator
- procedures for obtaining correct HV switching authorisation, including:
  - identification of WHS/OHS hazards, assessing and controlling risks
  - safety procedures and precautions
  - safe approach distances (SAD)
  - responsibilities and protocols
  - identifying switching resources
  - procedures for obtaining electrical access permits/authorities
  - requirements for team switching
  - procedures for coordination of operations
- use and operation of equipment associated with HV overhead and substation equipment, including:
  - test instruments
  - sticks
  - interrupters
  - arc stranglers
- operation of protection systems and substation equipment, such as:
  - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- types and categories of HV switchgear
- application, function and operating capabilities of switchgear
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV transmission main and working earths
- earthing HV electrical apparatus practices and procedures for access, including:
  - purposes of operational and additional work part - on-site earths
  - factors determining the location and effectiveness of operational earthing
  - acceptable industry procedures
  - personal protective equipment (PPE)
- HV switching techniques, including
  - pre-switching checks
  - switching operational procedures

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  - isolation procedures and proving dead/de-energised
  - earthing procedures
  - emergency fault procedures
  - energisation procedures
- application and function of the single wire earth return (SWER) system components, including:
  - circuit arrangement
  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER substations
- operation of HV overhead switching or indicating devices, including:
  - identifying hazards, assessing and controlling risks associated with HV switchgear operation
  - systematic and defensive techniques
  - mobile radio procedures
  - double isolation procedures
  - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, airbreaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
- primary causes, effects and types of HV electrical faults
- HV protection devices, including:
  - main components
  - types
  - categories
  - applications
  - functions
- basic principle of operation of HV system protection devices
- protection coordination and protection - zoning
- HV feeder auto-reclosing suppression, including:
  - function
  - application
- circuit condition requirements and switching considerations when paralleling and separating HV feeders
- operation of HV distribution transformers, including:
  - principle governing factors for transformer ratings
  - protection and alarms
  - operating limitations and the relationship between transformer and HV fuse rating
  - purpose and principle operation of HV distribution transformer tap changers
  - HV distribution transformer and transformer-cable combination switching practices
  - paralleling requirements
  - isolation and earthing procedures for access

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    - common distribution transformer and associated electrical apparatus faults
- HV underground switching equipment, such as:
    - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- function of feeder automation system and the main components
- operation procedure for a remote field device from a local control station
- functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
- function of the main components of a local/remote control system
- operation of a field devices using SCADA systems via a remote access terminal (RAT), dial up voice annunciated system and local control station.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry for perform HV field switching operations to a given schedule
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS47 Sample, test, filter and reinstate insulating oil

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to sample, test, filter and reinstate insulating oil in the electricity supply industry (ESI).

It includes despatching oil samples to a laboratory for higher level testing, as required and post operational servicing of equipment and/or plant. It also includes identifying related environmental issues concerning disposing oil safely.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDREL16 Working safely near live electrical apparatus

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Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to sample, test, filter and reinstate insulating oil	**1.1** Works schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for sampling, testing, filtering and reinstating insulating oil are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.6 Relevant work permits are obtained and signed in accordance with workplace procedures
	1.7 Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8 Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform work, as required

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	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.11	Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out sampling, testing, filtering and reinstating of insulating oil	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.3	Requirements for lifting and/or climbing and/or working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Sampling, testing, filtering and reinstating of insulating oil are applied to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.5	Sampling, testing, filtering and reinstating of the insulating oil is performed in accordance with work schedules, job requirements and workplace procedures
	2.6	Unplanned events in the filtering, sampling and testing of insulating oil are responded to in accordance with workplace procedures
	2.7	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.8	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the sampling, testing, filtering and reinstating of insulating oil	**3.10**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures

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3.2 WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required

3.3 Worksite is cleaned and confirmed safe in accordance with workplace procedures

3.4 Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage or disposed of in accordance with workplace procedures

3.5 Relevant work permits are signed off and equipment is returned to service in accordance with workplace procedures

3.6 Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS47A Sample, test, filter and reinstate insulating oil.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS47 Sample, test, filter and reinstate insulating oil

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- sampling, testing, filtering and reinstating insulating oil on at least two (2) of the following pieces of equipment:
  - transformer (tx) main tank
  - tx tap changer
  - switchgear
  - cable
  - reactor
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- filtering and sampling of insulating oil, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with filtering and sampling - safe handling procedures; personal hygiene, storage and disposal procedures; WHS/OHS hazards and precautions, including use of appropriate personal protective equipment (PPE); environmental procedures and effects of contaminates
  - properties of insulating oil - dielectric strength, moisture content, acidity and sludge
  - locations where insulating oil is used - transformer, switchgear and oil filled cable
  - filtering equipment – types, cleaning procedures and method of use
  - techniques in filtering and sampling insulating oil - methods of sampling, methods of filtering, testing procedures on site and analysing oil effectiveness
  - frequency of testing

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- testing of insulating oil, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with testing, such as precautions during testing and types of testing equipment
  - techniques in testing insulating oil - electric strength, water content, dielectric dissipation, resistivity and acidity
  - dissolved gas analysis (DGA)
- powerline safety practices, including:
  - protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
  - requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole; maintenance checks on different types of ladders; renewal of extension ropes; and the safety issues relating to clearances from overhead conductors
  - requirements for climbing and working aloft - methods used to identify a pole is safe to climb; methods used to inspect a line worker's body belt; application of knots and hitches appropriate to the requirements of a line worker; height safety principles, including personal fall protection, prevention and related requirements; and the practical procedure of climbing an overhead structure and fitting a pole chair
  - traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, demonstration of the procedures used to provide an effective traffic management scheme and the use of a two-way radio
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires; general fire prevention methods and the precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces - planning and identifying procedures; establishing responses; developing techniques; involvement of external emergency services; d emergency procedures for the rescue of an electric shock victim, including cardio pulmonary resuscitation (CPR)
  - requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances; determining system requirements; aircrew familiarisation with network operations and equipment; and requirements for effective communications operations for aerial work
- material handling and the environment, including:
  - methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
  - environmental standards, codes, environmental legislation, WHS/OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and/or enterprise requirements applicable environmental care when handling materials, including provision of manufacturer and supplier information such as material safety data sheets (MSDS)
  - types and application of PPE used for hazards substances and dangerous goods
  - techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from equipment, such as vehicle

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loading crane, chainsaw, enterprise vehicles and explosive power tools
    - procedures for handling and control of spillages of herbicides
    - methods of disposing and storage of herbicides, pesticides and chemicals
    - methods of cleaning mobile plant, equipment and tools
    - recording of data
- environmental issues when undertaking sampling and filtering of oil, including:
    - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the work to be undertaken
    - methods of obtaining updated environmental information and data sheets on the proper use and handling of oil used on transformers and switchgear, including provision of MSDS
    - techniques in filtering and sampling oil to eliminate/reduce risks to the environment from spillages
    - safety procedures and equipment for handling and control of the oil
    - methods of disposing and storage of the oil
    - methods of cleaning equipment, tools and equipment
    - emergency procedures for spillages of oil to reduce risks to the environment - methods of cleaning up excessive spillages, methods of protection to surrounding environment, procedures for notification of relevant personnel and authorities, and recording procedures
    - polychlorinated biphenyl (PCB) contamination, handling and disposal procedures
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, including:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
    - identification of environmental issues associated with the handling and disposing of insulation materials
    - safety precautions when handling and disposing of heat dissipation materials
    - safe working practices
    - WHS/OHS hazards and precautions
    - identification of hazards, assessing and controlling risks
    - types, selection, maintenance and uses of PPE
    - permit to work systems and isolation procedures
    - types and function of specialised equipment
    - safe working practices when using specialised equipment
    - emergency response and rescue, including first aid
    - techniques in the handling and disposing of insulation materials - PCB, asbestos, insulating oil and SF6 gas
- enterprise-specific policies and procedure instructions, including:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures

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  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs such as equipment operation
  - WHS/OHS records, including audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific specialised tools, including:
  - legislation, standards, codes, supply authority regulations and/specific enterprise regulations pertaining to the use and care of specialised tools - voltage detectors; polarity testers and phase rotation
  - characteristics, capabilities and application of specialised tools for a particular job
  - safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
  - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
  - techniques in pre-use inspection on the serviceability of specialised tools
  - techniques in the selection, use, maintenance and care and storage of specialised tools
  - identifying WHS/OHS hazards, assessing and controlling risks associated with their use

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  - techniques for the safe use of specialised power tools
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substation work, including responsibilities about the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any WHS/OHS requirements associated with the use of EWP
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
  - rescue and release procedures - rescue of personnel from energised conductors, emergency descent from an EWP and/or rescue from confined spaces
  - enterprise requirements - safe access and authorisation to work procedures; use of mobile extendable equipment on or near energised HV conductors; emergency response procedures; hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction; and dangers of near approach to energised conductors.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDRIS67 Solve problems in energy supply network equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to solve problems in energy supply network equipment in the electricity supply industry (ESI).

It includes determining correct operation of energy supply network electrical equipment and providing solutions. It also includes working safely, reading circuit and reticulation diagrams, applying problem solving processes from measurements and completing the necessary documentation.

The application of the skills and knowledge described in this unit may require a licence to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Competency Field

Industry Specific Cross Discipline

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Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in energy supply network equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Extent of work to be undertaken is determined from reports and/or discussions with relevant person/s
	1.3 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.4 Materials required for work are determined in accordance with workplace procedures
	1.5 Tools, equipment and testing devices required to take measurements are obtained in accordance with workplace procedures and checked for correct operation and safety
2 Solve problems in energy supply network equipment	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in accordance with WHS/OHS requirements and, when necessary, conducted in accordance with workplace safety procedures
	2.3 Circuits/machines/plant are isolated, where necessary, in accordance with WHS/OHS requirements and workplace procedures
	2.4 Safety hazards resulting from reports and risk control measures devised and implemented in consultation with appropriate personnel
	2.5 Problem solving of energy network equipment is approached methodically using measured and calculated

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		values of circuit/apparatus parameters
	2.6	Circuit/apparatus components are dismantled, where necessary, and parts stored to protect them against loss or damage
	2.7	Circuits/components are rechecked and their operational status is confirmed
	2.8	Materials/replacement parts required to solve problems are sourced and obtained in accordance with workplace procedures
	2.9	Effectiveness of the repair is tested in accordance with workplace procedures
	2.10	Apparatus is reassembled, tested and prepared for return to service
	2.11	Unplanned events are dealt with safely and with the approval of relevant personnel
	2.12	Problem-solving activities are completed without damage to apparatus, circuits, the surrounding environment or services applying sustainable energy practices
3 Complete and report on problem solving in energy supply network equipment	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares
	3.3	Maintenance work activities are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

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Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS67A Solve problems in energy supply network equipment.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS67 Solve problems in energy supply network equipment

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- solving problems in energy supply network equipment, including:
  - determining the operating parameters of existing energy supply equipment
  - envisaging the likely extent of work from reports and discussions with appropriate personnel
  - using methodical problem-solving techniques
  - solving problems efficiently
  - altering an existing energy supply equipment to comply with specified operating parameters
  - developing energy supply equipment to comply with a specified function and operating parameters
  - determining conditions causing an existing energy supply equipment to be unsafe
  - completing documentation correctly
- solving problems in energy supply network equipment on at least one (1) of the following energy supply network systems:
  - distribution overhead system
  - distribution underground system
  - transmission overhead system
  - transmission underground system
- using at least three (3) of the following distribution/transmission equipment:
  - voltage regulation equipment
  - on load tap changers
  - energy metering
  - demand meters
  - load control

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  - current transformers
  - potential transformers
- dealing with unplanned events on at least one (1) occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- generation, including:
  - primary energy sources
  - power stations
  - power station output
  - acts and legislation relating to generation
  - renewable energy sources and techniques
- transmission, including:
  - system requirements
  - principal components of a power system
  - voltage levels
  - grid systems
  - acts/legislation relating to transmission
  - future trends
- distribution, including:
  - high voltage (HV) distribution systems
  - medium/low voltage (LV) distribution systems
  - radial feeders
  - parallel feeders
  - ring main feeders
  - acts/legislation relating to distribution
- substations, including:
  - purpose
  - location
  - layout
- overhead and underground systems, including:
  - relative merits
  - applications

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  - planning
  - installation
- power distribution system electrical characteristics, including:
  - transmission and distribution systems
  - inductance, capacitance and resistance
- voltage problems in a power distribution system, including:
  - LV
  - unbalanced voltages
  - voltage rises
- voltage regulation, including:
  - autotransformers with on-load tap changer (OLTC)
  - transformers with OLTC
  - static capacitors
  - load control
- control of OLTC, including:
  - regulation relays
  - control circuits
  - line drop compensation
- power distribution system faults, including:
  - type/classification of fault
  - typical causes/effects of faults
  - three phase symmetrical fault levels
  - fault level limitation
- voltage surges in a power distribution system, including:
  - lightning surges
  - switching surges
  - typical surge levels
  - surge impedance, typical values
  - significance of the system surge impedance
- metering and metered quantities, including:
  - purpose
  - energy
  - maximum demand
  - accuracy classes for metering systems
- energy and demand meters, including:
  - construction
  - operation
  - adjustments
  - testing
- metering circuits, including:

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  - direct metering
  - instrument transformer metering
- electronic metering systems and recording meters, including:
  - types
  - applications
  - connections
- load control, including:
  - purpose
  - methods.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers determining correct operation of energy supply network protection equipment and systems and providing solutions as they apply to energy supply network protection. It encompasses working safely, reading circuit and reticulation diagrams, applying logical problem-solving processes from measurements and completing the necessary documentation.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Industry Specific Cross Discipline

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Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to solve problems in energy supply network protection equipment and systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The likely extent of work to be undertaken is envisaged from reports and/or discussions with appropriate personnel
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures
	1.6 Tools, equipment and testing devices needed to take measurements are obtained in accordance with established procedures and checked for correct operation and safety
2 Solve problems in energy supply network protection equipment and systems	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures

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	2.4	Safety hazards resulting from the reports identified and risk control measures devised and implemented in consultation with appropriate personnel
	2.5	Problem solving is approached methodically drawing on knowledge of energy supply network protection equipment and systems using measured and calculated values of circuit/apparatus parameters
	2.6	Circuit/apparatus/system components are dismantled, where necessary, and parts stored to protect them against loss or damage
	2.7	Circuits/components/systems are rechecked and their operational status is confirmed
	2.8	Materials/replacement parts required to solve problems are sourced and obtained in accordance with established procedures
	2.9	Effectiveness of the repair is tested in accordance with established procedures
	2.10	Apparatus is reassembled, finally tested and prepared for return to service
	2.11	Unexpected situations are dealt with safely and with the approval of authorised personnel
	2.12	Problem-solving activities are carried out without damage to apparatus, circuits the surrounding environment or services using sustainable energy practices
3 Complete and report problem solving in energy supply network protection equipment and systems	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares
	3.3	Maintenance work activities are documented in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS68A Solve problems in energy supply network protection equipment and systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- solving problems in energy supply network equipment including all of the following:
  - determining the operating parameters of existing energy supply protection equipment and systems
  - envisaging the likely extent of work from reports and discussions with appropriate personnel
  - using methodical problem-solving techniques
  - solving problems efficiently
  - altering an existing energy supply protection equipment to comply with specified operating parameters
  - developing energy supply protection equipment to comply with a specified function and operating parameters
  - determining conditions causing an existing energy supply protection equipment to be unsafe
  - completing documentation correctly
- solving problems in energy supply network systems including at least one (1) of the following:
  - distribution overhead system
  - distribution underground system
  - transmission overhead system
  - transmission underground system
- solving problems in energy supply protection equipment and systems including at least two (2) of the following:
  - over-current protection
  - earth fault protection
  - differential protection

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  - oil and gas devices
  - busbar protection
  - surge protection
  - conventional relays
  - electronic relays
  - reclosers/sectionalisers
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- protection fundamentals encompassing:
  - purpose of protection
  - features of a protection scheme
- instrument transformers for protection encompassing:
  - operating principles
  - applications of current transformers
  - applications of voltage transformers
- feeder protection encompassing:
  - fuse protection
  - overcurrent and earth fault
  - sensitive earth fault
  - unit schemes
  - distance protection
  - trip/close sequences for feeders
  - recloser/sectionaliser systems
- transformer protection encompassing:
  - overheating protection
  - overcurrent protection
  - restricted earth fault protection
  - differential protection
  - oil and gas devices
- busbar protection encompassing:
  - types of fault
  - requirements of busbar protection
  - system protection
  - frame-earth protection
- surge protection encompassing:
  - voltage surges

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- surge diverters
- arcing horns.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in apparatus in energy supply and distribution systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply apparatus to logical fault-finding processes, implementing fault rectification, safety and functional testing, and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

Competency Field

Industry Specific Cross Discipline

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Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures

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	2.4	Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Causes of faults are identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in apparatus components are rectified to raise energy supply apparatus to its operation standard
	2.8	Apparatus is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

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competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS69A Diagnose and rectify faults in energy supply apparatus.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in energy supply apparatus, including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- control of voltage encompassing:
  - conditions leading to voltage collapse and system disintegration
  - effects on the system of high voltage (HV)/low voltage (LV)
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers; electromagnetic voltage regulators; series and parallel capacitors; on-load tap changers (OLTC) transformers and static VAR compensations (SVCs), such as saturated reactor (SR) compensations, thyristor controlled reactor (TCR) compensators, combined

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TCR/TSCs and the production of wave-form distorting harmonics and control devices

- the importance of the location in the system of voltage control devices
- the use of graphical methods to calculate the size of VAR regulating plant
- control of power encompassing:
  - base load and spinning reserve
  - regulating machines
  - rapid start plant
  - phase shifting transformers and various forms of load shedding
  - principles and practices of automated control of individual machines
  - stations and transmission/tie-line elements
  - synchronising power
- the relationship between power and frequency encompassing:
  - limiting values
  - machine stabilising - steam by-pass, rapid valving, slip stabilisers and over speed limiting
  - use of single pole generator CB's
  - use of machine AVR's as angular stabilisers
  - damped and un-damped system oscillations
  - relationship between fault clearance times and system stability
  - calculation of critical clearance angles based on equal area criteria
- types of communication systems encompassing:
  - telephone, power line carrier, dedicated cable, microwave links and fibre optics
  - quantities and signals to be communicated
  - advantages and disadvantages of the various systems
  - equipment requirements
- transient over-voltages in power systems encompassing:
  - switching and lightning over-voltages and their effect on different plant items
  - transient over-voltage control and reduction using surge diverters, shield wires and CB control
  - insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings
- factors leading to the generation of corona encompassing:
  - consequences of corona
  - reduction of corona
  - conductor bundling, grading rings and conductor surface treatment
- power system protection encompassing:
  - location of CT's in major plant items
  - earthing principles and devices
  - fault current control/limitation using neutral earthing compensators (NEC's), neutral point earth impedances, high conductivity shield wires and parallel feed interlocking
  - application of different types of protection.

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Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in networks supplying electrical energy to consumers. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault-finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

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Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements, and when necessary, conducted within established safety procedures

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	2.3	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of fault is identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS70A Diagnose and rectify faults in electrical energy distribution systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in electrical energy distribution systems including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases, the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- distribution system overview encompassing:
  - regulatory conditions of supply and utilisation
  - compliance with Australian Standards
  - reticulation system, including overhead/underground, urban/rural, high voltage (HV) customers and high-rise building systems
  - methods used to ensure continuity of supply

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- types of substations in current use
- systems of distribution used, (primary and secondary)
- voltage levels, power factor, wave-form distortion and transient loading
- supply quality
- load curve profiles (residential/industrial/commercial)
- types of feeders
- distribution systems (urban, rural single-phase systems, single wire earth return (SWER), spur, parallel and ring systems)

- overhead lines and installation encompassing:
  - industry and safety regulations
  - overhead conductors
  - conductor material
  - current rating factors (heating, voltage drops and power losses)
  - aerial bundled cables (HV and low voltage (LV))
  - covered conductors - characteristics of lines and cables, including the calculation of R, X and B for different arrangements of conductor; typical values for actual lines; transposition; models based on line length; voltage and line regulation
  - overhead line poles
  - types (wood, concrete and steel)
  - installation of poles (tooling, rake, life, labelling and sinking)
  - maintenance of poles (above and below ground)
  - pole strength and loads
  - crossarms
  - types and standard sizes
  - insulators
  - insulation types
  - types (pin, suspension or disc and shackle)
  - creepage and necessary clearances
  - arcing horns and insulator mounting
  - structure types
  - mechanical properties (working strength, maximum tension and limiting size)
  - interpretation of stringing charts
  - determination of sag (by calculations or measurement and/or tension measurement)
  - sight and wave sagging, and sag correction
  - stays
  - components and anchorage
- use of design schedules encompassing:
  - sample design problems - common design practice line, voltage, structure types used, line deviation, span sag, cross-arms, insulators and stays, wind loading and line deviation loading basic surveying

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  - measurement of levels, deviation angle and compass bearings
  - perform survey of short distribution line extension of produce field notes
- underground cables encompassing:
  - cable types, ratings, core material, design considerations, cable dielectrics, insulating materials and abbreviations, electric stress, cable voltage drop and voltage drop calculations, cable termination, joints and installation
  - induction and eddy currents
  - cable testing and cable fault location
  - cable drawing
- voltage regulations of feeders and associated equipment encompassing:
  - terminology used - distribution system, service line, customer's terminals, customer voltage, utilisation voltage, base voltage, voltage variation and bandwidth
  - voltage limits and effects of voltage variation
  - causes of variation - inductance, capacitance and reactance of distribution lines, and transformers
  - methods of voltage control - off-load, on-load tap changers, voltage regulating relays, line drop compensation and different types of voltage regulators
  - voltage profiles - principles, effect on voltage profiles, limits of voltage, voltage drops due to LV mains transformers, tap-settings feeder and service lines
  - determining voltage drops for components within the profile
- control of voltage - conditions leading to voltage collapse and system disintegration; effects on the system of HV/LV; and voltage control devices encompassing:
  - voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - on-load tap changer (OLTC) transformers and static VAR compensations (SVCs)
- range of devices covered by SVCs encompassing:
  - saturated reactor (SR) compensations
  - thyristor controlled reactor (TCR) compensators
  - combined TCR/TSCs
  - production of wave-form distorting harmonics and control devices
- importance of the location in the system of voltage control devices
- types of communication systems encompassing:
  - telephone, power line carrier, dedicated cable, micro-wave links and fibre optics
  - quantities and signals to be communicated
  - advantages and disadvantages of the various systems
  - equipment requirements
- transient over-voltages in power systems encompassing:
  - switching and lightning over-voltages and their effect on different plant items
  - transient over-voltage control and reduction using surge diverters, shield wires and CB control

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    - insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings
- the principles of operation, voltage and current range, breaking capacity and field of use of circuit breakers - bulk oil, small oil volume, air break, vacuum and SF6 (double pressure and puffer types)
- the types of isolators in use, such as duo-roll, blade and scissor type
- circuit breaker auxiliary systems encompassing:
    - direct current (d.c.) systems, including battery types, charging and protection systems and earth fault detection systems
    - SF6 conditioning, storage and handling systems.

Assessment Conditions

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in electrical energy transmission systems. The unit encompasses applying safe working practices, interpreting diagrams and technical data; applying knowledge of energy supply and transmission systems to logical fault-finding processes; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

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Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance with WHS/OHS

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		requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose electrical energy transmission system faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Source of fault is identified and appropriately competent person/s engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the system components are rectified to raise electrical energy transmission system to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in electrical energy supply transmission systems, including:
  - applying logical diagnostic methods
  - using fault scenarios to test the source of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- overview of the transmission system encompassing:
  - lines, buses, transformers and cables; line/bus layouts, including single and double switching, breaker and a half systems and high voltage (HV) crossing methods
- the principles involved in HV alternating current (a.c.) transmission encompassing:
  - tower types and configurations; choice of towers or poles (economic and environmental); insulator types and configuration; types of conductors, their configuration and standard nomenclature; typical line spacing and ground clearances; line ratings based on ambient

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temperature; conductor terminating and clamping equipment, including vibration damping principles and equipment

- principles involved in direct current (d.c.) transmission encompassing:
  - the economics, harmonic generation, VAR requirements and protection difficulties; types of connections and transformer requirements; advantages and disadvantages of d.c. transmission; typical overseas systems and likely (future) use in Australia
- the principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers
  - bulk oil
  - small oil volume
  - air break
  - air blast
  - air puffer
  - vacuum and
  - SF6 (double pressure and puffer types)
- the types of isolators in use, such as duo-roll, blade and scissor type
- circuit breaker auxiliary systems encompassing:
  - high pressure air systems, and air storage and handling processes
  - d.c. systems, including battery types, charging and protection systems and earth fault detection systems
  - SF6 conditioning, storage and handling system
- the characteristics of lines and cables encompassing:
  - the calculation of R, X and B for different arrangements of conductor; typical values for actual lines; transposition; models based on line length; voltage and line regulation; the transmission of power (P) and VARs (Q)
- control of voltage - conditions leading to voltage collapse and system disintegration, effects on the system of high voltage (HV)/low voltage (LV), and voltage control devices including:
  - voltage regulators applied to generators and synchronous phase modifiers
  - electromagnetic voltage regulators
  - series and parallel capacitors
  - on-load tap changer (OLTC) transformers and static VAR compensations (SVCs)
- range of devices covered by SVCs, including:
  - saturated reactor (SR)compensations
  - thyristor controlled reactor (TCR) compensators
  - combined TCR/TSCs
  - production of wave-form distorting harmonics and control devices
- importance of the location in the system of voltage control devices
- use of graphical methods to calculate the size of VAR regulating plant
- types of communication systems including:
  - telephone, power line carrier, dedicated cable, micro-wave links and fibre optics; quantities and signals to be communicated; Advantages and disadvantages of the various

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systems and equipment requirements

- transient over-voltages in power systems, including:
  - switching and lightning over-voltages and their effect on different plant items; transient over-voltage control and reduction using surge diverters, shield wires and CB control; insulation systems, insulation coordination, insulation grading in plant items, and bushings and capacitor bushings
- factors leading to the generation of corona encompassing:
  - consequences of corona; reduction of corona, including conductor bundling, grading rings and conductor surface treatment.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers diagnosing and rectifying faults in distributed generation systems. The unit encompasses applying safe working practices; interpreting diagrams and technical data; applying knowledge of energy supply and reticulation systems to logical fault-finding processes; implementing fault rectification, safety and functional testing; and reporting work activities and outcomes.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

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Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to diagnose and rectify faults	**1.1** work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
	1.4 The extent of faults is determined from reports and other documentation and from discussions with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the worksite
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety
2 Diagnose and rectify faults	**2.1** WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live work is determined in strict accordance with WHS/OHS requirements and, when necessary, conducted within established safety procedures

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	2.3	Circuits/machines/plant are checked as being isolated, where necessary, in strict accordance WHS/OHS requirements and procedures
	2.4	Logical diagnostic methods are applied to diagnose distributed generation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements
	2.5	Suspected fault scenarios are tested as being the source of system problems
	2.6	Causes of faults are identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system
	2.7	Faults in the system components are rectified to raise distributed generation system to its operation standard
	2.8	System is tested to verify that it operates as intended and to specified requirements
	2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate personnel and job specifications and requirements
	2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes
	2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services using sustainable energy practices
3 Complete and report fault diagnosis and rectification activities	**3.1**	WHS/OHS work completion risk control measures and procedures are followed
	3.2	Worksite is made safe in accordance with established safety procedures
	3.3	Rectification of faults is documented in accordance with established procedures
	3.4	Appropriate person/s is notified in accordance with established procedures that the system faults have been rectified

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Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS72A Diagnose and rectify faults in distributed generation systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- diagnosing and rectifying faults in distributed generation systems including:
  - applying logical diagnostic methods
  - using fault scenarios to test the cause of system faults
  - identifying faults and competency needed to rectify them
  - rectifying faults in system controls
  - verifying that the system operates correctly
  - documenting fault rectification
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant WHS/OHS legislation
  - principles and practice of effective WHS/OHS safety management
  - management arrangements relating to regulatory compliance
  - enterprise hazards and risks, control measures and relevant expertise required
  - characteristics and composition of workforce and their impact on WHS/OHS

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management
  - relevance of enterprise management systems to WHS/OHS management
  - analysis of working environment and design of appropriate WHS/OHS management systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- distributive generation systems encompassing:
  - concept and application
  - anti-islanding control and protection
  - system monitoring and load management.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS73 Develop engineering solutions for energy supply power transformer problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, applying extensive knowledge of energy supply power transformer operation and their application, gathering and analysing data, applying problem-solving techniques, and developing and documenting solutions and alternatives.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG006A Solve problems in single and three phase low voltage machines

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UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Distribution Pathway Unit Group

UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Transmission Pathway Unit Group

UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for energy supply power transformer problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The extent of the transformer problem is determined from performance specifications and situation reports and in consultation with relevant personnel
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work

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	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering solutions for energy supply power transformer problems	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Knowledge of supply power transformer arrangements, operation, device characteristics and applications are applied to developing solutions to supply power transformer problems
	2.3	Parameters, specifications and performance requirements in relation to each transformer problem are obtained in accordance with established procedures
	2.4	Approaches to resolving supply power transformer problems are analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Test, document and implement engineering solution for energy supply power transformer problems	**3.1**	Solutions to transformer problems are tested to determine their effectiveness and modified where necessary
	3.2	Adopted solutions are documented, including instruction for their implementation that incorporates risk control measures to be followed
	3.3	Appropriately competent and qualified person/s) required to implement solutions to supply power transformer problems is coordinated in accordance with regulatory requirements and enterprise policy
	3.4	Justification for solutions used to solve supply power transformer problems is documented for inclusion in work/project development records in accordance with professional standards

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Note: A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS73A Develop engineering solutions for energy supply power transformer problems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS73 Develop engineering solutions for energy supply power transformer problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing engineering solutions for energy supply power transformer, including:
  - understanding the extent of the transformer problems
  - forming effective strategies for solution development and implementation
  - obtaining transformer parameters, specifications and performance requirements appropriate to each problem
  - testing and finding solutions to transformer problems
  - documenting instruction for implementation of solutions that incorporate risk control measure to be followed
  - documenting justification of solutions implemented in accordance with professional standards
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- transformer construction and operating principles encompassing:
  - various types of lamination style and core construction used in single phase, three phase, double wound and auto transformers
  - different winding styles/types used in transformers

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  - how input current is limited on no-load and how power is transferred from primary to secondary when a load is connected
  - using the transformation ratio to determine an unknown quantity of V, I and VA
  - significance of nameplate data items
  - operation of a transformer under load/no-load conditions
  - the reason any particular type of transformer is used in a specific application
  - safety features specified in regulatory standards with respect to transformers
  - safety features specified in regulatory standards with respect to isolating transformers
  - basic insulation resistance, continuity and winding identification tests
- transformer parameters encompassing:
  - the percentage impedance of a transformer by test
  - percentage impedance of a transformer by calculation
  - the equivalent circuit of a transformer
  - calculation of voltage regulation
  - losses that occur in a transformer
  - tests to determine losses
  - efficiency and state typical values
  - the all-day efficiency of a transformer
- cooling methods encompassing:
  - methods of natural and forced cooling
  - properties of transformer oil
  - tests performed on transformer oil
  - auxiliary equipment
  - the purpose and operation of the types of auxiliary equipment used on transformers - bushings, explosion vents, surge diverters, tap changers, conservator, breathers and desiccants, gas relays and temperature indicators
- instrument transformers encompassing:
  - construction of current transformers
  - uses and ratings of current transformers
  - construction of voltage transformers
  - uses and ratings of voltage transformers
  - safety techniques when using instrument transformers
- transformer connections encompassing:
  - vector group of a transformer from a connection diagram
  - connections of a three phase transformer to create a particular vector group
  - reasons for using the different vector groups
  - purpose of tertiary windings
  - consequences/effect of an incorrect connection
- parallel operation encompassing:
  - polarity markings for the windings of a transformer

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  - conditions/restrictions for parallel operation of transformers
  - calculation of loading on transformers operating in parallel
  - connection of transformers in parallel to supply a common load
  - the consequences/effect of an incorrect connection
- harmonics in transformers encompassing:
  - how harmonics are generated in transformers
  - problems caused by harmonics in transformers
  - measurement of the harmonics in a transformer
  - methods/equipment used to overcome harmonics in transformers
- high voltage (HV) isolation encompassing:
  - the term HV
  - procedures for isolating HV apparatus
  - regulations with respect to access permits
  - clearances to be observed with respect to HV up to 33 kV
  - the term ‘step’ and ‘touch’ potential.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRIS74 Develop engineering solutions for energy supply system protection problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely; applying extensive knowledge of energy supply system protection operation, protection devices and their application; gathering and analysing data; applying problem-solving techniques and developing and documenting solutions and alternatives.

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions.

The application of the skills and knowledge described in this unit requires a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRIS68 Solve problems in energy supply network protection equipment and systems

UETTDRIS69 Diagnose and rectify faults in energy supply apparatus

Distribution Pathway Unit Group

UETTDRIS70 Diagnose and rectify faults in electrical energy distribution systems

Transmission Pathway Unit Group

UETTDRIS71 Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

UETTDRIS72 Diagnose and rectify faults in distributed generation systems

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to develop engineering solution for energy supply system protection problems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) processes and procedures for a given work area are identified, obtained and understood
	1.2 Established WHS/OHS risk control measures and procedures in preparation for the work are followed
	1.3 The extent of the protection problem is determined from performance specifications and situation reports and in consultation with relevant personnel
	1.4 Activities are planned to meet scheduled timelines in

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		consultation with others involved in the work
	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently
2 Develop engineering solution for energy supply system protection	**2.1**	WHS/OHS risk control measures and procedures for carrying out the work are followed
	2.2	Knowledge of supply system protection arrangements, operation, device characteristics and applications are applied to developing solutions to supply system protection problems
	2.3	Parameters, specifications and performance requirements in relation to each protection problem are obtained in accordance with established procedures
	2.4	Approaches to resolving supply system protection problems are analysed to provide most effective solutions
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policies
	2.6	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards
3 Test, document and implement engineering solution for energy supply system protection problems	**3.1**	Solutions to protection problems are tested to determine their effectiveness and modified where necessary
	3.2	Adopted solutions are documented, including instruction for their implementation that incorporates risk control measure to be followed
	3.3	Appropriately competent and qualified person/s required to implement solutions to supply system protection problems is coordinated in accordance with regulatory requirements and enterprise policies
	3.4	Justification for solutions used to solve supply system protection problems is documented for inclusion in work/project development records in accordance with

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professional standards

Note: A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS74A Develop engineering solutions for energy supply system protection problems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRIS74 Develop engineering solutions for energy supply system protection problems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- developing engineering solutions for energy supply system protection, including:
  - understanding the extent of the protection problem
  - forming effective strategies for solution development and implementation
  - obtaining protection parameters, specifications and performance requirements appropriate to each problem
  - testing and solutions to protection problems
  - documenting instructions for implementation of solutions that incorporate risk control measure to be followed
  - documenting justification of solutions implemented in accordance with professional standards
  - dealing with unplanned events on at least one occasion.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- protection scheme requirements encompassing:
  - requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes,

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duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity and reliability
    - components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation and need for interfacing
    - protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes and protection overlap
    - protection applied to transformers - biased differential, gas, winding temperature and oil temperature
    - protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising and over voltage
    - protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance and offset
- discrete protection systems encompassing:
    - earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination and backup protection
    - overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination and backup protection
    - alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, and over temperature schemes
- interdependent protection systems encompassing:
    - overcurrent and earth leakage intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
    - pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme and pilot supervisory techniques
    - load shedding, voltage control, parallel operation and load rejection
    - CB failure protection
    - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- complex protection systems encompassing:
    - distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes and bus zone
    - differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations and digital systems
    - types of revenue metering
    - applications of supervisory control and data acquisition (SCADA)

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- complex protection systems for communications
- harmonic control
- point on wave switching.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRRF06 Perform rescue from a live LV panel

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the performance of rescue procedures from live low voltage (LV) apparatus, not including overhead lines and underground cables in the workplace. It specifies the mandatory requirements of rescue from a live LV panel and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

HLTAID001 Provide cardiopulmonary resuscitation

Competency Field

Refresher Training

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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1 Prepare to perform rescue procedures from live LV panel	**1.1**	Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained
	1.2	Electricity isolation point is identified and labelled, where appropriate
	1.3	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures
2 Carry out rescue from live LV panel	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing and isolating the LV panel and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for applying cardiopulmonary resuscitation (CPR), if required at the site, and gaining access to treatment by a medical professional, if necessary, are followed
	2.4	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the LV panel rescue procedure	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF06B Perform rescue from a live LV panel.

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Links

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Assessment Requirements for UETTDRRF06 Perform rescue from a live LV panel

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment
- identifying and labelling the isolation point
- performing a rescue from a low voltage (LV) panel in accordance with workplace procedures.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- emergency procedures for the rescue of a victim from a live LV panel encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances SAD appropriate to rescue from a live LV panel
  - involvement of external emergency services
- emergency procedures required for the rescue of a victim from a live LV panel encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to rescue from a live LV panel
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

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Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for performing rescues from a live LV panel
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRSB23 Install and maintain substation direct current systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to install and maintain substation direct current systems in the electricity supply industry (ESI).

It includes installing and maintaining substation direct current (DC) systems such as main batteries, communication batteries, DC lighting systems, battery chargers, uninterrupted power supply (UPS) systems and associated control circuits in accordance with workplace procedures. It also includes diagnosing faults, replacing faulty equipment, conducting pre-commissioning/re-commissioning tests and interpreting test results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to install and/or maintain substation d.c. systems	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule

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	1.6	Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the installation and maintenance of substation d.c. systems	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Substation d.c. systems are installed safely to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Installation of substation d.c. systems is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Maintenance of substation d.c. systems is performed in

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		accordance with work schedules, job requirements and workplace procedures
	2.9	Installation and/or maintenance of substation d.c. systems are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
	2.11	Substation d.c. systems are performance tested in accordance with workplace procedures and job specifications
	2.12	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the installation and maintenance of substation d.c. systems	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and equipment made ready for service in accordance with workplace procedures, if required
	3.3	Worksite is cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB23A Install and maintain substation direct current systems.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRSB23 Install and maintain substation direct current systems

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- working on at least one (1) of the following types of batteries:
  - nickel cadmium batteries
  - lead acid batteries
  - gel cell batteries
- working on at least one (1) of the following battery systems:
  - main batteries
  - communication batteries
- working on all of the following equipment:
  - battery chargers
  - d.c. control circuits
- performing at least two (2) of the following types of tests:
  - cell voltage test
  - hydrometer/specific gravity test
  - battery discharge and capacity tests
  - impedance testing
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements

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  - safety precautions specific to working on or near energised LV conductors - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
  - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship
  - methods of obtaining the up-to-date information on enterprise policies and procedures
  - rules and regulations
  - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
  - techniques when dealing with others - working in teams, customer relation, and complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
  - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
  - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
  - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
  - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
  - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
  - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
  - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
  - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
  - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with

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switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risk, types, selection, maintenance and use of PPE, responsibilities and protocols and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and

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protocols in accordance with enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
    - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
    - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
    - types of electrical systems, including a.c., d.c. and combinations of both
    - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in-service plant/equipment
    - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
    - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
    - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
    - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
    - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
    - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
    - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP), and any

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WHS/OHS requirements associated with the use of EWP
    - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
    - control of oil spills - identification, use and maintenance of spill oil control equipment and materials, and oil containment facilities and systems
    - rescue and release procedures - rescue procedures of personnel from energised conductors, emergency descent from an EWP and/or confined spaces
    - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
    - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- design principles of substation LV a.c. and d.c. supply systems, including:
    - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
    - wiring conventions, systems and labelling conventions
    - substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
    - LV design specifications, supply requirements and electrical load assessments
    - substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, d.c. distribution panels and control systems, a.c. distribution panels and control systems, and auto change-over requirements,
    - control equipment and auxiliary relays, flags and alarms
    - common panel layouts.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations

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- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to maintain capacitor bank equipment for voltage regulation in the electricity supply industry (ESI).

It includes maintaining and repairing substation voltage regulating equipment and is restricted to high voltage (HV) capacitor banks and associated switching reactors and the inspection, recording of information, testing and measurement of the associated control circuits. It also includes the range of acceptance tests and discharge requirements for complete units within a substation in accordance with industry standards and workplace procedures, fault diagnosis and return to service tests and interpretation of test results against agreed specifications.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

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UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Plan to maintain voltage regulating equipment (capacitor banks)	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6 Equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7 Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to facilitate work, as required
	1.8 Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace

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		procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out the maintenance of voltage regulating equipment (capacitor banks)	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with workplace procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place in accordance with job requirements and/or workplace procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with workplace procedures
	2.4	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Capacitor bank is isolated, discharged and maintained in accordance with workplace procedures
	2.7	Defective capacitor elements are identified, located and replaced in accordance with manufacturer instructions and workplace procedures
	2.8	Capacitor network is balanced and pre-service tests and measurements completed in accordance with workplace procedures
	2.9	Voltage regulating equipment (capacitor banks) are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.10	Unplanned events are responded to in accordance with workplace procedures
3 Complete the maintenance of voltage regulating	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and

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equipment (capacitor banks)		anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and the capacitor bank is made ready for service
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment, surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Work records, reports and/or documentation are completed in accordance with workplace procedures and relevant personnel notified

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB29A Maintain capacitor bank equipment for voltage regulation.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- maintaining at least one (1) of the following systems:
  - double star neutral current unbalance type
  - voltage unbalance type, single star
- maintaining at least two (2) of the following components:
  - internal discharge resistor cans
  - external resistor type
  - switching reactors
  - neutral unbalance current transformer
- performing at least three (3) of the following types of tests:
  - insulation resistance tests
  - capacitance tests
  - unbalance current/voltage tests
  - primary injection tests
  - high voltage (HV) direct current d.c. withstand tests
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- safe working on energised low voltage (LV) equipment, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on or near energised LV conductors - safe working

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practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of personal protective equipment (PPE)
    - work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, and release and rescue procedures for work on or near exposed energised LV conductors
- enterprise-specific policies and procedure instructions, including:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining the up-to-date information on enterprise policies and procedures
    - rules and regulations
    - induction into workplace - location of work area and storage area, timetable, uniform, personal wellbeing, housekeeping rules, emergency procedures and evacuation procedures
    - techniques when deal with others - working in teams, customer relation, and complaint and issues procedures
    - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions, including:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise PPE - type and application; where and when to be used; method of replacement; responsibility of maintenance, including cleaning, inspection and testing; and emergency response, rescue, evacuation and first aid procedures
    - personal wellbeing – hygiene, fatigue/stress management and drugs/alcohol
    - WHS/OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, and training as part of broader programs, such as equipment operation
    - WHS/OHS records - audits; inspection reports; workplace health and environmental monitoring records; training and instruction records; manufacturer and supplier information, such as material safety data sheets (MSDS); registers; maintenance reports; workers compensation and rehabilitation records; and first aid/medical records
- enterprise-specific technical drawing and documents, including:
    - types and application of enterprise-specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
    - instructions/worksheets - types and application of enterprise-specific symbols and diagrams
    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawing, including:
    - types and application of enterprise-specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and

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catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors, polarity testers and phase rotation)
    - characteristics, capabilities and application of specialised tools for a particular job
    - safety policies, procedures and precautions with regards to using, transporting and storing specialised tools
    - selection methods for obtaining the correct specialised tool for the particular job, including during procurement, purchasing and/or hiring arrangements
    - techniques in pre-use inspection on the serviceability of specialised tools
    - techniques in the selection, use, maintenance, and care and storage of specialised tools
    - identifying WHS/OHS hazards, and assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific equipment installation procedures, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to equipment installation
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be installed
    - identification of components within the equipment to be installed and associated control housings
    - use, characteristics and capabilities of specialised tools and equipment
    - enterprise-specific policies and procedures for equipment to be installed
    - control equipment and auxiliary relays, flags and alarms
    - techniques in evaluating serviceability of equipment to be installed
    - safety precautions when testing and measuring equipment to be installed - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to data management
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types of enterprise-specific computer software
    - techniques in storing and retrieving data and reports from the computer
    - techniques in using the data management systems in following necessary commands and protocols in accordance with enterprise-specific procedures

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  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- fault conditions and symptoms related to the plant and/or equipment type, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to typical fault conditions and systems
  - interpretation of faults in operating mechanisms, such as drive trains and mechanical power drives; stored energy systems, including hydraulic systems, pneumatic systems and mechanical storage systems; and accumulators
  - interpretation of faults in electrical control systems, such as electromechanical relay systems, micro-processor-based systems, programmable logic controller (PLC) systems, integrated control systems or combinations of electrical/mechanical systems
  - types of electrical systems, including alternating current (a.c.), d.c. and combinations of both
  - types of fault conditions - failure to operate and failure in service, including the appropriate procedures for work on or in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over pressure, under pressure, out of tolerance measurements and checks
- substation equipment components and materials related to the plant and/or equipment type, including:
  - types of components - complete unit of plant and/or equipment; replacement components or appropriate substitutes; their dimensions, suitability and serviceability; also, the components associated with the local control systems of the equipment, including indication of levels, quantities, volumes, pressures and temperatures, and the operating principles of these devices and components
  - types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
  - techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present WHS/OHS hazards to persons in the workplace
- substation safety practices, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements pertaining to substation safety practices
  - techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
  - requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment; maintenance checks on different types of ladders; renewal of extension ropes and the safety issues relating to clearances from energised conductors
  - requirements for climbing and working at heights in substations - attached climbing principles; selection, use and operation of elevated work platforms (EWP) and any

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WHS/OHS requirements associated with the use of EWPs
  - control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
  - control of oil spills - identification, use and maintenance of spill oil control equipment and materials; and oil containment facilities and systems
  - rescue and release procedures - the rescue procedures for personnel from energised conductors, emergency descent from an EWP and/or confined spaces
  - enterprise requirements - safe access and authorisation to work procedures, use of mobile extendable equipment on or near energised HV conductors, and emergency response procedures
  - hazards associated with work in substations, including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, and dangers of near approach to energised conductors
- principles of power transformer construction and operations, including:
  - applications of static reactive plant in HV networks, including voltage control, volt-ampere reactive VAR control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators and combinations of these
  - operating characteristics and operational constraints, including point on wave switching issues
  - ratings, cooling systems and control systems and ancillary equipment used
  - configurations and system layout, including single star, double star and bridge type
  - typical protection systems used, including neutral unbalance current and neutral unbalance voltage
  - techniques used when balancing elements within static reactive plant
  - safety precautions when testing and maintaining HV static reactive plant - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRSB39 Perform power system substation switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit involves the skills and knowledge required to perform power system substation switching operation to a given schedule in the electricity supply industry (ESI).

It includes conducting switching operations in a substation in accordance with given instructions, switching schedule and workplace procedures. It also includes operation of substation switching devices such as circuit breakers, air break switches, fuses, reclosers, ring main units and isolators.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may apply under State and Territory legislative and regulatory licensing requirement which must be confirmed prior to commencing this unit.

Pre-requisite Unit

All competencies in the Common Unit Group must have been completed, plus all competencies in one (1) of the identified Pathway Unit Group(s).

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

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UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRTP26 Install transmission structures and associated hardware
UETTDRTP27 Maintain transmission structures and associated hardware
UETTDRTP29 Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group
UETTDRDP12 Maintain overhead energised low voltage conductors and cables
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRIS56 Install and maintain low voltage overhead services
Rail Traction Pathway Group
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS52 Install and maintain poles, structures and associated hardware
UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables
UETTDRRT21 Install traction overhead wiring systems
UETTDRRT22 Maintain traction overhead wiring systems
UETTDRRT23 Install rail traction bonds
UETTDRRT27 Install overhead traction components and equipment
UETTDRRT28 Maintain overhead traction components and equipment
Distribution Cable Jointing Pathway Group
UETTDRCJ21 Lay ESI electrical cables
UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables
UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS55 Install and maintain low voltage underground services
Electrical Pathway Group
UEENEEE137A Document and apply measures to control OHS risks associated with

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electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Substation

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare for substation switching to given schedule	**1.1** Switching and work schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS), environmental and workplace procedures for substation switching are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures

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	1.5 Hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant authority is obtained to access and perform switching in accordance with workplace procedures
	1.7 Plant, equipment, tools and personal protective equipment (PPE) required for work is identified, obtained and confirmed in working order
	1.8 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.9 Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out substation switching to given schedule	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace procedures
	2.2 Requirements for lifting and/or climbing and/or working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.3 Substation switching to given schedule are applied to ensure completion in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4 Communications with switching control officer are established and maintained throughout isolation operation in accordance with workplace procedures
	2.5 Electrical equipment, associated circuits, line/network or worksite to be switched is isolated and checked as de-energised using appropriate devices, earthed, where required, and load transferred in accordance with job requirements and workplace procedures
	2.6 Substation switching to a given schedule is performed in accordance with work schedule, job requirements and workplace procedures
	2.7 Unplanned events are responded to in accordance with workplace procedures

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	2.8	Relevant work permits are prepared and issued in accordance with workplace procedures
	2.9	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete substation switching to given schedule	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.4	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with workplace procedures
	3.6	Work records, reports and/or documentation are completed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB39A Perform power system substation switching operation to a given schedule.

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Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRSB39 Perform power system substation switching operation to a given schedule

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- checking all the following:
  - approvals/clearances
  - access permits
- using all the following:
  - operating sticks
  - operating earths
  - voltage detectors
- using all the following:
  - phasing equipment
  - ground equipment isolating handles and earths
- using at least one (1) of the following:
  - links
  - air break switches
  - fuses
- using at least two (2) of the following:
  - reclosers
  - ring main units
  - circuit breakers
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

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- installation of switchgear and associated equipment, including:
  - types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, and requirements and techniques
  - types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
  - installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and/or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, and pole mounted locations
  - maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
  - testing and commissioning - ESI standards and procedures
- low voltage (LV) switching principles including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - personnel protective equipment (PPE) for LV switching
- high voltage (HV) switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
  - role of the HV switching operator
  - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, and access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - types and categories of HV switchgear
  - application, function and operating capabilities of switchgear
  - restrictions pertaining to HV switching equipment
  - procedures for the isolation of HV transmission main and working earths
  - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and

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effectiveness of operational earthing, acceptable industry procedures, PPE and HV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV fault switching principles, including:
    - primary causes, effects and types of HV electrical faults
    - HV protection devices - main components, types, categories, applications and functions
    - basic principle of operation of HV system protection devices
    - protection coordination and protection zoning
    - HV feeder auto-reclosing suppression – function and application
    - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- HV distribution transformer principles, including:
    - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer-cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
    - HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- HV single wire earth return (SWER) system, including:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system, including:
    - function of feeder automation system and the main components
    - operation procedure for a remote field device from a local control station
    - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
    - SCADA system security interlocks and access restrictions
    - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
    - function of the main components of a local/remote control system
    - operation of a field devices using SCADA systems via a RAT, dial up annunciated system and local control station
- HV overhead and substation switching principles, including:

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- legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to HV overhead and substation switching
- requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
- role and responsibilities of the HV switching operator
- operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
- use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
- HV switchgear – types, categories, application and operating capabilities
- operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, airbreaks, switches, disconnects, live line clamps, phasing sticks and phasing tester
- operation of protection systems and substation equipment - fault levels and settings, types and applications, protection systems and substation equipment fault levels and settings, and types and applications
- restrictions pertaining to HV switching equipment
- procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing, and HV switching techniques
- operating switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry performing power system substation switching operations to a given schedule

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- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UEE Electrotechnology Training Package

Modification History

Not applicable.

Credit Arrangements

At the time of endorsement of this Training Package no national credit arrangements exist.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

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UEESS00131 Data Communications - ACMA 'Open' Cabling Provider Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00048 Data Communications - ACMA 'Open' Cabling Provider.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to undertake Australian Communications and Media Authority (ACMA) 'Open' Cabling Provider Registration.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

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Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is available to persons wishing to undertake work in telecommunication cabling requiring ACMA ‘Open’ cabling provider registration.

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’ for ACMA ‘Open’ Cabling Provider Registration.

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Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for ACMA ‘Open’ Cabling Provider Registration.

Custom Content Section

Not applicable.

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UEESS00132 Data Communications - ACMA 'Restricted' Telecommunications Cabling Registration Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00049 Data Communications - ACMA 'Restricted' Telecommunications Cabling Registration.

Description

This Skill Set is for persons who are required to undertake Australian Communications and Media Authority (ACMA) Restricted Telecommunications Cabling Registration.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate II, Certificate III and Certificate IV, qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEEDV0013 Solve problems in voice and data communications circuits

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **5 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications

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UEEDV0003 Install and connect cabling for direct access to telecommunications service

Target Group

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’ for ACMA ‘Restricted’ Telecommunications Cabling Registration.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for ACMA 'Restricted' Telecommunications Cabling Registration.

Custom Content Section

Not applicable.

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UEESS00133 Restricted - Disconnection/Reconnection of Fixed Wired Low Voltage Electrical Equipment

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

Description

This Skill Set is for persons wishing to disconnect and reconnect low voltage (LV) fixed wired electrical equipment which is incidental or a primary and regular function of work related to a principle work function.

It includes working safely on electrical equipment, isolating LV electrical supplies, selecting and using testing and measuring devices, disconnecting and reconnecting electrical equipment, terminating and connecting cables and conductors in accordance with Australian Standards, and completing required reporting.

This excludes disconnecting or reconnecting circuits at a switchboard or to general electrical accessories (including switches, socket outlets, light etc); or installation of or alteration to any part of the fixed electrical wiring system (defined as electrical installing work).

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III and Certificate IV qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERL0004	Disconnect - reconnect electrical equipment connected to low voltage (LV) installation wiring

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Target Group

The units of competency in this Skill Set are for persons who already hold a relevant Certificate III or equivalent and the work is incidental or a primary and regular function of work related to a principle work function.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for a Restricted Electrical Licence - disconnection/reconnection of fixed wired low voltage electrical equipment.

Custom Content Section

Not applicable.

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UEESS00134 Data Communications - Install Aerial Communication Cables Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00050 Data Communications - Install Aerial Communication Cables.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to install aerial communication cables.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0002	Install aerial telecommunication cables
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services

AND

UEECD0043	Solve problems in direct current circuits

OR

UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

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Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0002	Install aerial telecommunication cables
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is available to persons wishing to undertake work in telecommunication cabling requiring Australian Communications and Media Authority (ACMA) ‘Open’ Cabling Provider Registration with aerial endorsement.

Note:

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’ for ACMA ‘Open’ Cabling Provider Registration with aerial endorsement.

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Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing aerial communication cables.

Custom Content Section

Not applicable.

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UEESS00135 Instrumentation - Programmable Control Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00124 Instrumentation - Programmable control systems.

Description

This Skill Set covers development, installation and testing of programs for programmable logic controllers (PLC) for a system requiring discrete control functions and industrial system requiring advanced control functions.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirement

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers

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Target Group

This Skill Set is intended for persons who are required to develop, install and test programs for programmable control systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for Instrumentation – Programmable control systems.

Custom Content Section

Not applicable.

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UEESS00136 Sustainable - Electrical Installations Sustainability Strategies Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00123 Sustainable - Electrical Installations Sustainability Strategies.

Description

This Skill Set is for persons responsible for developing strategies to address greenhouse gases and sustainability issues for residential, commercial and industrial electrical installations.

Pathways Information

The unit of competency in this Skill Set can contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set must already hold a current Unrestricted Electrical Licence issued in an Australian state or territory.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEERE0014	Develop strategies to address sustainability issues for electrical installations

Target Group

This Skill Set is intended for persons who are required to develop electrical installation sustainability strategies.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry

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requirements for electrical installations sustainability strategies.

Custom Content Section

Not applicable.

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UEESS00137 Data Communications - Install Below Ground Communication Cables Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00053 Data Communications - Install Below Ground Communication Cables.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to install below ground communication cables.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0007	Install underground communication cables
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

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Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0007	Install underground communication cables
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is available to persons wishing to undertake work in telecommunication cabling requiring Australian Communications and Media Authority (ACMA) ‘Open’ Cabling Provider Registration with underground endorsement.

Note:

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that

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safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved' for ACMA 'Open' Cabling Provider Registration with underground endorsement.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing below ground communication cables.

Custom Content Section

Not applicable.

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UEESS00138 Data Communications - Test, Report and Rectify Faults in Data and Voice Installations Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00119 Data Communications – Test, report and rectify faults in data and voice installations.

Description

This Skill Set covers testing for certification, and finding and repairing faults in telecommunication installations and local area networks (LANs).

The Skill Set encompasses working safely, reading cabling diagrams, performance testing, applying logical fault-finding procedures, testing functionality of the network, conducting repairs and completing the necessary documentation.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set must already hold:

- ACMA 'Open' Cabling Registration and nationally recognised endorsements for structured cable and optical fibre.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEDV0014	Test, report and rectify faults in data and voice installations

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Target Group

This Skill Set is intended for persons who are required to test, report and rectify faults in data and voice installations.

This Skill Set meets the ACMA industry recognised endorsement for testing.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for testing, reporting and rectifying faults in data and voice installations.

Custom Content Section

Not applicable.

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UEESS00139 Data Communications - Restricted Telecommunications Cabler Registration - ACMA Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00054 Data Communications - Restricted Telecommunications Cabler Registration - ACMA.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to undertake restricted telecommunications cabler registration.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0003	Install and connect cabling for direct access to telecommunications service
and	
UEECD0043	Solve problems in direct current circuits
or	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate

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II, Certificate III and Certificate IV, qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the unit:

- UEECD0042 Solve problems in ELV single path circuits

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0003	Install and connect cabling for direct access to telecommunications service
and	
UEECD0043	Solve problems in direct current circuits
or	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set meets the minimum Australian Communications and Media Authority (ACMA) ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’ for ACMA ‘Restricted’ Cabling Provider Registration.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for restricted telecommunications cabler registration - ACMA.

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Custom Content Section

Not applicable.

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UEESS00140 Data Communications - Premises Cabling for NBN Rollout Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00116 Data Communications – Premises Cabling for NBN Rollout.

Description

This Skill Set covers the installation and modification of high-performance data communication cabling in buildings and premises and intended for connecting a telecommunications network.

The Skill Set encompasses working safely and to industry standards and specifications, installing multiple data lines and backbones using structured twisted pair cabling and optical fibre cabling, terminating at distributors, termination modules and in socket outlets, testing and compliance checks, preparing and filling trenches, placing conduits and ducts, drawing cables, installing catenary cable, fixing communication cables, terminating at distributors, splices and on socket outlets, testing and compliance checks and completing necessary documentation.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this skill set must already hold the following:

- Australian Communications and Media Authority (ACMA) 'Open' Cabling Registration.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **4 units** of competency must be attained.

UEEDV0002 Install aerial telecommunication cables

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UEEDV0006	Install and modify optical fibre performance data communication cabling
UEEDV0007	Install underground communication cables
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling

Target Group

This Skill Set is intended for persons who are required to undertake premises cabling for NBN rollout.

Note:

This Skill Set meets the ACMA industry recognised endorsements for optical fibre, structured cable, underground cabling and overhead cabling.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for premises cabling for NBN rollout.

Custom Content Section

Not applicable.

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UEESS00141 Electrical - Providing Advice on Lighting Products Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00057 Electrical - Providing advice on lighting products.

Description

This Skill Set is for persons who are required to provide advice on lighting products.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEEEL0016	Provide advice on effective and energy efficient lighting products
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications

Target Group

This Skill Set is intended for persons who are required to undertake work in the electrical and/or retail industry where customers will seek advice on effective and energy efficient lighting products.

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Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for electrical – providing advice on lighting products.

Custom Content Section

Not applicable.

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UEESS00142 Data Communications - Plan an Integrated Cabling Installation System Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00118 Data Communications – Plan an integrated cabling installation system.

Description

This Skill Set covers planning of cable routes for intelligent power and lighting, information and communications, entertainment systems, distributed video and audio; energy management and control; security and safety; digital home health; and age and assisted living.

This unit encompasses determining immediate and future cabling needs of an installation and their origins and termination points, planning cable routes, specifying cable types, sizes, fixing/support methods and cable identification systems and documenting cabling plans based on calculated and/or deemed-to-comply solutions as well as the planning of the wiring hub, as required.

The Skill Set encompasses working safely and to industry standards and specifications and completing necessary documentation.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set must already hold:

- Australian Communications and Media Authority (ACMA) 'Open' Cabling Registration.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

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UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits
UEECD0028	Plan an integrated cabling installation system

Target Group

This Skill Set is intended for persons who are required to plan an integrated cabling installation system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for planning an integrated cabling installation system.

Custom Content Section

Not applicable.

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UEESS00143 Instrumentation - Develop an Integrated System Interface for Access Through a Touch Screen Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00073 Instrumentation - Develop a integrated system interface for access through a touch screen.

Description

This Skill Set is for persons who are required to develop an integrated system interface for access through a touch screen.

Pathways Information

The unit of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirement

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEEIC0011 Develop electrical integrated systems

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEIC0009	Develop an electrical integrated system interface for access through a touch screen

Target Group

This Skill Set is intended for persons who are required to develop an integrated system interface for access through a touch screen.

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Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for developing touch screen access in an integrated system.

Custom Content Section

Not applicable.

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UEESS00144 Instrumentation - Develop Integrated Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00075 Instrumentation - Develop integrated systems.

Description

This Skill Set is for persons who are required to develop integrated systems.

Pathways Information

The unit of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirement

It is essential that persons undertaking this Skill Set already hold unit/s in electrical, electronic and data communication work and competency in the use of personal computers:

- UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

OR

- UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

AND

- ICTICT203 Operate application software packages

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEIC0011 Develop electrical integrated systems

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Target Group

This Skill Set is intended for persons who are required to develop integrated systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for developing integrated systems.

Custom Content Section

Not applicable.

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UEESS00145 Instrumentation - Plan the Installation of Integrated Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00077 Instrumentation - Plan the installation of integrated systems.

Description

This Skill Set is for persons who are required to plan the installation of an integrated system.

Pathways Information

The unit of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirement

It is essential that persons undertaking this Skill Set already hold the following unit in electrical, electronic and data communication work:

- UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

OR

- UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEIC0024 Plan the electrical installation of integrated systems

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Target Group

This Skill Set is intended for persons who are required to plan the installation of an integrated system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for planning integrated systems.

Custom Content Section

Not applicable.

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UEESS00146 RAC - Design Ammonia Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00078 Refrigeration-Air Conditioning - Design Ammonia Refrigeration Systems.

Description

This Skill Set is for persons who are required to design ammonia refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

AND

- UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

OR

- Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Engineering Technology - Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **3 units** of competency must be attained.

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UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant
UEERA0014	Design ammonia refrigerated systems
UEERA0016	Design commercial refrigeration systems and select components

Target Group

This Skill Set is intended for persons who are required to design ammonia refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for designing ammonia refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00147 RAC- Design Complex Carbon Dioxide Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00079 Refrigeration-Air Conditioning - Design Complex Carbon Dioxide Refrigeration Systems.

Description

This Skill Set is for persons who are required to design complex carbon dioxide refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this skill set already hold the following unit:

- UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

AND

- UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

OR

- Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Engineering Technology - Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

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Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant
UEERA0015	Design carbon dioxide refrigerated systems
UEERA0016	Design commercial refrigeration systems and select components

Target Group

This Skill Set is intended for persons who are required to design complex carbon dioxide refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for designing complex carbon dioxide refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00148 RAC - Design Hydrocarbon Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00080 Refrigeration-Air Conditioning - Design Hydrocarbon Refrigeration Systems.

Description

This Skill Set is for persons who are required to design hydrocarbon refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this skill set already hold the following unit:

- UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

AND

- UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

OR

- Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Engineering Technology - Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

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Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants
UEERA0016	Design commercial refrigeration systems and select components
UEERA0023	Design hydrocarbon refrigerated systems

Target Group

This Skill Set is intended for persons who are required to design hydrocarbon refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for designing hydrocarbon refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00149 RAC - Design Secondary Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00081 Refrigeration-Air Conditioning - Design Secondary Refrigeration Systems.

Description

This Skill Set is for persons who are required to design secondary refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEERA0034 Establish heat loads for commercial refrigeration and/or air conditioning applications

AND

- UEERA0042 Evaluate thermodynamic and fluid parameters of refrigeration systems

OR

- Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Air Conditioning and Refrigeration Engineering

OR

- Advanced Diploma of Engineering Technology - Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

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Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERA0016	Design commercial refrigeration systems and select components
UEERA0027	Design secondary refrigerant systems

Target Group

This Skill Set is intended for persons who are required to design secondary refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for designing secondary refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00150 RAC - Install and Commission Ammonia Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00082 Refrigeration-Air Conditioning - Install and Commission Ammonia Refrigeration Systems.

Description

This Skill Set is for persons who are required to install and commission ammonia refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERA0005 Apply safety awareness and legal requirements for ammonia refrigerant

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UEERA0046	Install and commission ammonia refrigeration systems, components and associated equipment
UEERA0065	Repair and service ammonia refrigeration systems

Target Group

This Skill Set is intended for persons who are required to install and commission ammonia refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and commissioning ammonia refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00151 RAC - Install and Commission Carbon Dioxide Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00083 Refrigeration-Air Conditioning - Install and Commission Carbon Dioxide Refrigeration Systems.

Description

This Skill Set is for persons who are required to install and commission carbon dioxide refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant

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UEERA0047	Install and commission carbon dioxide refrigeration systems, components and associated equipment
UEERA0066	Repair and service carbon dioxide refrigeration systems

Target Group

This Skill Set is intended for persons who are required to install and commission carbon dioxide refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and commissioning carbon dioxide refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00152 RAC - Install and Commission Flammable Refrigerant Air Cond. and Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00084 Refrigeration-Air Conditioning - Install and Commission Hydrocarbon Refrigeration Systems, Major Components and Associated Equipment.

Description

This Skill Set is for persons who are required to install and commission hydrocarbon refrigeration systems, major components and associated equipment.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants

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UEERA0048	Install and commission flammable refrigerant air conditioning and refrigeration systems

Target Group

This Skill Set is intended for persons who are required to install and commission hydrocarbon refrigeration systems, major components and associated equipment.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and commissioning hydrocarbon refrigeration systems, major components and associated equipment.

Custom Content Section

Not applicable.

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UEESS00153 RAC - Operate Ammonia Refrigeration Plant Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00085 Refrigeration-Air Conditioning - Operate Ammonia Refrigeration Plant.

Description

This Skill Set is for persons who are required to operate ammonia refrigeration plant.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant
UEERA0057	Operate ammonia refrigeration plant

Target Group

This Skill Set is intended for persons who are required to operate ammonia refrigeration plant.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements to operate ammonia refrigeration systems.

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Custom Content Section

Not applicable.

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UEESS00154 RAC - Service and Repair Ammonia Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00086 Refrigeration-Air Conditioning - Service and Repair Ammonia Refrigeration Systems.

Description

This Skill Set is for persons who are required to service and repair ammonia refrigeration system.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERA0005	Apply safety awareness and legal requirements for ammonia refrigerant
UEERA0065	Repair and service ammonia refrigeration systems

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Target Group

This Skill Set is intended for persons who are required to service and repair ammonia refrigeration system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for servicing and repairing ammonia refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00155 RAC - Service and Repair Carbon Dioxide Refrigeration and Heat Pump Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00087 Refrigeration-Air Conditioning - Service and Repair Carbon Dioxide Refrigeration and Heat Pump Systems.

Description

This Skill Set is for persons who are required to service and repair carbon dioxide refrigeration and heat pump systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- UEERA0089 Service refrigeration appliances

OR

- Certificate III in Air Conditioning and Refrigeration

OR

- Certificate III in Appliance Service

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

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UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant
UEERA0068	Repair and service self-contained carbon dioxide refrigeration and heat pump systems

Target Group

This Skill Set is intended for persons who are required to service and repair carbon dioxide refrigeration and heat pump systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for servicing and repairing carbon dioxide refrigeration and heat pump systems.

Custom Content Section

Not applicable.

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UEESS00156 RAC - Service and Repair Carbon Dioxide Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00088 Refrigeration-Air Conditioning - Service and Repair Carbon Dioxide Refrigeration Systems.

Description

This Skill Set is for persons who are required to service and repair carbon dioxide refrigeration systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERA0006	Apply safety awareness and legal requirements for carbon dioxide refrigerant

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UEERA0066 Repair and service carbon dioxide refrigeration systems

Target Group

This Skill Set is intended for persons who are required to service and repair carbon dioxide refrigeration systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for servicing and repairing carbon dioxide refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00157 RAC - Service and Repair Flammable Refrigerant Refrigeration and Air Conditioning Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00089 Refrigeration-Air Conditioning - Service and Repair Hydrocarbon Refrigeration and Air Conditioning Systems.

Description

This Skill Set is for persons who are required to service and repair hydrocarbon refrigeration and air conditioning systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following unit:

- UEERA0053 Install, commission, service and maintain medium temperature systems

OR

- UEERA0089 Service refrigeration appliances

OR

- Certificate III in Air Conditioning and Refrigeration

OR

- Certificate III in Appliance Service

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

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UEERA0007	Apply safety awareness and legal requirements for flammable refrigerants
UEERA0084	Service and repair self-contained flammable refrigerants air conditioning and refrigeration systems

Target Group

This Skill Set is intended for persons who are required to service and repair hydrocarbon refrigeration and air conditioning systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for servicing and repairing hydrocarbon refrigeration and air conditioning systems.

Custom Content Section

Not applicable.

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UEESS00158 RAC - Service and Repair Secondary Refrigeration Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00090 Refrigeration-Air Conditioning - Service and Repair Secondary Refrigeration Systems.

Description

This Skill Set is for persons who are required to service and repair secondary refrigeration systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following units:

- UEERA0053 Install, commission, service and maintain medium temperature systems

AND

- UEERA0051 Install, commission, service and maintain air conditioning systems

OR

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEERA0067 Repair and service secondary refrigeration systems

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Target Group

This Skill Set is intended for persons who are required to service and repair secondary refrigeration systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for servicing and repairing secondary refrigeration systems.

Custom Content Section

Not applicable.

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UEESS00159 Sustainable - Designer of Grid Connected Photovoltaic Systems Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces but is not equivalent to UEESS00100 Sustainable - Designer of Grid Connected Photovoltaic Systems.

Description

This Skill Set is for persons who are required to design grid-connected photovoltaic systems.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEERE0011	Design grid-connected photovoltaic power supply systems
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems
AND	
UEECD0043	Solve problems in direct current circuits
OR	

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UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is intended for persons who are required to design grid-connected photovoltaic systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for designers of grid-connected photovoltaic systems.

Custom Content Section

Not applicable.

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UEESS00161 Sustainable - Energy Assessment of Commercial Facilities Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00102 Sustainable - Energy assessment of commercial facilities.

Description

This Skill Set is for persons who are required to undertake an energy assessment of commercial facilities.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set already hold a current Unrestricted Electrical Licence issued in an Australian state or territory.

Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERE0003	Assess energy loads and uses for energy efficiency in commercial facilities
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises
UEERE0014	Develop strategies to address sustainability issues for electrical installations

Target Group

This Skill Set is intended for persons who are required to undertake an energy assessment of

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commercial facilities.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for energy assessment of commercial facilities.

Custom Content Section

Not applicable.

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UEESS00162 Sustainable - Energy Assessment of Industrial Properties and Enterprises Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00103 Sustainable - Energy Assessment of industrial properties and enterprises.

Description

This Skill Set is for persons who are required to undertake energy assessments of industrial properties and enterprises.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set already hold a current Unrestricted Electrical Licence issued in an Australian state or territory.

Skill Set Requirements

A total of **3 units** of competency must be attained.

UEERE0004	Assess energy loads and uses for energy efficiency in industrial properties and enterprises
UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises
UEERE0014	Develop strategies to address sustainability issues for electrical installations

Target Group

This Skill Set is intended for persons who are required to undertake energy assessments of

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industrial properties and enterprises.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for energy assessment of industrial properties and enterprises.

Custom Content Section

Not applicable.

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UEESS00163 Sustainable - Energy Assessment of Residential, Office and Retail Premises Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00104 Sustainable - Energy assessment of residential, office and retail premises.

Description

This Skill Set is for persons who are required to undertake energy assessment of residential, office and retail premises.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set already hold a current Unrestricted Electrical Licence issued in an Australian state or territory.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEERE0005	Assess energy loads and uses for energy efficiency in residential, office and retail premises
UEERE0014	Develop strategies to address sustainability issues for electrical installations

Target Group

This Skill Set is intended for persons who are required to undertake energy assessment of residential, office and retail premises.

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Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for energy assessment of residential, office and retail premises

Custom Content Section

Not applicable.

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UEESS00164 Sustainable - Energy Efficiency Auditor Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00105 Sustainable - Energy Efficiency Auditor.

Description

This Skill Set is for persons who are required to undertake energy efficiency audits.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

It is essential that persons undertaking this Skill Set already hold a Degree in Electrical Engineering, an Advanced Diploma or Diploma of Electrical Engineering or an electrical trade qualification from the UEE Electrotechnology Training Package or equivalent.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **4 units** of competency must be attained.

UEECD0010	Compile and produce an energy sector detailed report
UEECD0024	Implement and monitor energy sector WHS policies and procedures
UEERE0001	Apply environmentally and sustainable procedures in the energy sector
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures

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Target Group

This Skill Set is intended for persons who are required to undertake energy efficiency audits.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for an energy efficiency auditor.

Custom Content Section

Not applicable.

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UEESS00165 Sustainable - Energy Efficiency Systems Designer Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00106 Sustainable - Energy Efficiency Systems Designer.

Description

This Skill Set is for persons who are required to design energy efficiency systems.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

It is essential that persons undertaking this Skill Set already hold a Degree in Electrical Engineering, an Advanced Diploma or Diploma of Electrical Engineering or an electrical trade qualification from the UEE Electrotechnology Training Package or equivalent.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **4 units** of competency must be attained.

UEECD0012	Contribute to risk management in electrotechnology systems
UEECD0041	Solve electrotechnical engineering problems
UEEEL0011	Evaluate performance of low voltage electrical apparatus
UEERE0010	Design energy management controls for electrical installations in buildings

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Target Group

This Skill Set is intended for persons who are required to design energy efficiency systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for a designer of energy efficient systems.

Custom Content Section

Not applicable.

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UEESS00166 Sustainable - Energy Efficiency Systems Developer Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00107 Sustainable - Energy Efficiency Systems Developer.

Description

This Skill Set is for persons who are required to develop energy efficiency systems.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

It is essential that persons undertaking this Skill Set already hold a Degree in Electrical Engineering, an Advanced Diploma or Diploma of Electrical Engineering or an electrical trade qualification from the UEE Electrotechnology Training Package or equivalent.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **7 units** of competency must be attained.

UEECD0010	Compile and produce an energy sector detailed report
UEECD0012	Contribute to risk management in electrotechnology systems
UEECD0041	Solve electrotechnical engineering problems
UEEEL0011	Evaluate performance of low voltage electrical apparatus
UEERE0010	Design energy management controls for electrical installations in buildings
UEERE0012	Develop effective engineering strategies for energy reduction in buildings

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UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector

Target Group

This Skill Set is intended for persons who are required to develop energy efficiency systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for an energy efficiency systems developer.

Custom Content Section

Not applicable.

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UEESS00167 Sustainable - Identify Energy Efficiency Strategies Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00109 Sustainable - Identify Energy Efficiency Strategies.

Description

This Skill Set is for persons who are required to identify energy efficiency strategies.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

It is essential that persons undertaking this Skill Set already hold a Degree in Electrical Engineering, an Advanced Diploma or Diploma of Electrical Engineering or an electrical trade qualification from the UEE Electrotechnology Training Package or equivalent.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **4 units** of competency must be attained.

UEECD0010	Compile and produce an energy sector detailed report
UEECD0012	Contribute to risk management in electrotechnology systems
UEERE0012	Develop effective engineering strategies for energy reduction in buildings
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector

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Target Group

This Skill Set is intended for persons who are required to identify energy efficiency strategies.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements to identify energy efficiency strategies.

Custom Content Section

Not applicable.

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UEESS00169 Data Communications - Install and Modify Performance Data Communication Structured Cabling Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00052 Data Communications - Install and Modify Performance Data Communication Structured Cabling.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to install and modify performance data communication structured cabling.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits

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UEECD0046	Solve problems in single path circuits

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is available to persons wishing to undertake work in telecommunication cabling

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requiring Australian Communications and Media Authority (ACMA) ‘Open’ Cabling Provider Registration with structured cabling endorsement.

Note:

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved’ for ACMA ‘Open’ Cabling Provider Registration with structured cabling endorsement.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and modifying performance data communication structured cabling.

Custom Content Section

Not applicable.

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UEESS00170 Install and Modify Performance Data Communication Optical Fibre Cabling Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00051 Data Communications - Install and Modify Performance Data Communication Optical Fibre Cabling.

June 2025: Skill set requirements appended to description as a change without release to preserve content in migration to new training package authoring system.

Description

This Skill Set is for persons who are required to install and modify performance data communication optical fibre cabling.

Detailed Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0006	Install and modify optical fibre performance data communication cabling
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

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Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

The following **units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services
UEEDV0006	Install and modify optical fibre performance data communication cabling
AND	
UEECD0043	Solve problems in direct current circuits
OR	
UEECD0044	Solve problems in multiple path circuits
UEECD0046	Solve problems in single path circuits

Target Group

This Skill Set is available to persons wishing to undertake work in telecommunication cabling requiring Australian Communications and Media Authority (ACMA) ‘Open’ Cabling Provider Registration with Fibre Optic endorsement.

Note:

This Skill Set meets the minimum ACMA ‘prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability

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where customer equipment and standard telephone service are involved' for ACMA 'Open' Cabling Provider Registration with fibre optic endorsement.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and modifying performance data communication optical fibre cabling.

Custom Content Section

Not applicable.

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UEESS00171 Fire Detection and Alarm Systems - Installation, Maintenance, Commissioning and Servicing Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00058 Electronic - Fire Detection and Alarm Systems - Installation, Maintenance, Commissioning and Servicing.

Description

This Skill Set is for persons who are required to install, maintain, commission and service electronic fire detection and alarm systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **9 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology equipment
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEEEC0008	Commission large fire protection systems
UEEEC0026	Enter and verify programs for fire protection systems
UEEEC0041	Install fire detection and warning system apparatus

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UEEEC0071	Troubleshoot fire protection systems
UEEEC0076	Verify compliance and functionality of fire protection system installations

Target Group

This Skill Set is intended for persons who are required to install, maintain, commission and service electronic fire detection and alarm system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing, maintaining, commissioning and servicing electronic fire detection and alarm systems.

Custom Content Section

Not applicable.

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UEESS00172 Attachment of Cords and Plugs to Single Phase Low Voltage Electrical Equipment Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00091 Restricted - Attachment of cords and plugs to single phase low voltage electrical equipment.

Description

This Skill Set is designed for persons wishing to attach flexible cords and plugs for voltages operating to 250 volts (V). These competencies are in addition to competencies already gained in the relevant field to which the electrical work is incidental or a primary and regular function of the work.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate II, Certificate III and Certificate IV qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

Target Group

The units of competency in this Skill Set are for persons holding a relevant electrotechnology qualification at a Certificate II or higher and the work is incidental or a primary and regular

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function of work related to a principle work function.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for Restricted Electrical Licence - Attachment of cords and plugs to single phase low voltage electrical equipment.

Custom Content Section

Not applicable.

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UEESS00173 Attachment of Cords/Cables and Plugs to Low Voltage Three Phase Electrical Equipment Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00092 Restricted - Attachment of cords/cables and plugs to low voltage three phase electrical equipment.

Description

This Skill Set is designed for persons wishing to attach flexible cords/cables and plugs for voltages operating up to 1,000 volt (V) alternating current (a.c.). These competencies are in addition to competencies already gained in the relevant field to which the electrical work is incidental or a primary and regular function of the work.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate II, Certificate III and Certificate IV qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **3 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERL0001	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply
UEERL0002	Attach cords, cables and plugs to electrical equipment for connection to 1000 V a.c. or 1500 V d.c.

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Target Group

The units of competency in this Skill Set are for persons holding a relevant electrotechnology qualification at a Certificate II or higher and the work is incidental or a primary and regular function of work related to a principle work function.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for restricted electrical licence - attachment of cords/cables and plugs to low voltage three phase electrical equipment.

Custom Content Section

Not applicable.

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UEESS00174 Electrical Safety Testing of Electrical Cord Connected Equipment and Cord Assemblies Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00098 Restricted - Electrical safety testing of electrical cord connected equipment and cord assemblies.

Description

This Skill Set is designed for persons wishing to undertake the testing, tagging and reporting of portable/handheld low voltage (LV) electrical equipment using a portable appliance tester (PAT). These competencies are in addition to competencies already gained in the relevant field to which the electrical work is incidental or a primary and regular function of the work.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate II, Certificate III and Certificate IV qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Target Group

The units of competency in this Skill Set are for persons required to ensure the safety of portable equipment and the work is incidental or a primary and a regular function of work related to a

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principle work function.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for electrical safety testing of electrical cord connected equipment and cord assemblies.

Custom Content Section

Not applicable.

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UEESS00175 Apply Compliance Requirements to all Aspects of Electrical Work Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

New Skill Set.

Description

This Skill Set covers the skills and knowledge required to apply work health and safety (WHS)/occupational health and safety (OHS) and electrical installation safety obligations of persons licensed to undertake electrical work.

It encompasses WHS/OHS requirements for identifying hazards, establishing levels of risk mitigation control, following safe working methods, determining whether an electrical installation is compliant, dealing with installation defects and documenting activities and outcomes.

Pathways Information

This Skill Set does not provide any articulation to any qualification or other unit of competency.

Licensing/Regulatory Information

This Skill Set has been designed to meet jurisdictional regulatory/licensing currency requirements for holders of an 'Unrestricted Electrical Licence'.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEEL0001	Apply compliance requirements to all aspects of electrical work

Target Group

This Skill Set is intended for electrical licence holders who, according to the regulatory authority, have exhibited recalcitrance in their licence and/or WHS/OHS obligations.

It may be called up by an electrical safety or WHS/OHS authority as a means of retraining of such licence holders. Incompetence in not meeting required obligation could result from:

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- a competent person acting incompetently, or
- a previously competent person failing to keep abreast of changes and developments in the WHS/OHS requirements and practices, the Australian/New Zealand Wiring Rules and local service rules and related regulatory requirements.

As the purpose of this Skill Set is to address the deficiencies described above, the application of this unit requires that candidates shall not be afforded Recognition of Prior Learning (RPL) and must undertake training and assessment to demonstrate competency in all aspects of the work of the unit.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for compliance requirements to all aspects of electrical work.

Custom Content Section

Not applicable.

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UEESS00176 Apply Currency of Safe Working Practices and Compliance Verification of Electrical Installations

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

New Skill Set.

Description

This Skill Set covers current practices in working safely and verifying compliance of electrical installations that affect the currency of competencies held. It encompasses working safely, procedures for rescue from contact with live parts and for applying emergency first aid.

It also encompasses current practices in visual inspections and mandatory compliance testing, identifying non-compliance defects and mandatory reporting requirements.

Pathways Information

This Skill Set does not provide any articulation to any qualification or other unit of competency.

Holders of an ‘Unrestricted Electrical Licence’ or a ‘Qualified Electrical Contracting Licence’ are required by regulation to periodically undertake the unit UEEEL0002 Apply currency of safe working practices and compliance verification of electrical installations, to demonstrate currency in safe working, electrical rescue practices and compliance verification of electrical installations.

A ‘licensed electrician’ applying for an ‘electrical contractor's licence’ may be required by regulation to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case the candidate shall:

- hold a current ‘Unrestricted Electrical Licence’ issued in an Australian state or territory
- have recently been in permanent employment as a licensed electrician.

Licensing/Regulatory Information

This Skill Set has been designed to meet jurisdictional regulatory/licensing currency requirements for holders of an 'Unrestricted Electrical Licence'.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEEL0002	Apply currency of safe working practices and compliance verification of

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electrical installations

Target Group

This Skill Set is intended for holders of an 'Unrestricted Electrical Licence' or 'Qualified Electrical Contracting Licence' required by regulation to periodically undertake the unit UEEEL0002 Apply currency of safe working practices and compliance verification of electrical installations, to demonstrate currency in safe working, electrical rescue practices and compliance verification of electrical installations.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for currency of safe working practices and compliance verification of electrical installations

Custom Content Section

Not applicable.

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UEESS00177 Data Communications - Plan an Integrated Cabling Installation System - Electricians Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00120 Data Communications – Plan an integrated cabling installation system - Electricians Skill Set.

Description

This Skill Set covers planning of cable routes for intelligent power and lighting, information and communications, entertainment systems, distributed video and audio; energy management and control; security and safety; digital home health; age and assisted living.

This Skill Set encompasses determining immediate and future cabling needs of an installation and their origins and termination points, planning cable routes, specifying cable types, sizes, fixing/support methods and cable identification systems and documenting cabling plans based on calculated and/or deemed-to-comply solutions as well as the planning of the wiring hub if required.

The Skill Set encompasses working safely and to industry standards and specifications, and completing necessary documentation.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set must already hold the following:

- Australian Communications and Media Authority (ACMA) 'Open' Cabling Registration

OR

- a current electrical licence issued in an Australian state or territory.

Licensing/Regulatory Information

Not applicable.

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Skill Set Requirements

A total of **2 units** of competency must be attained.

UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits
UEECD0028	Plan an integrated cabling installation system

Target Group

This Skill Set is intended for persons who are required to plan an integrated cabling installation - electrical system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for planning an integrated cabling installation system.

Custom Content Section

Not applicable.

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UEESS00178 Electrical - Develop and Implement Maintenance Programs Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00126 Electrical - Develop and Implement Maintenance Programs Skill Set.

Description

This Skill Set covers skills, knowledge and work performance requirements to allow qualified electricians to develop and implement energy sector maintenance programs and compile and produce an energy sector detailed report.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set hold the following:

- UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

OR

- a current 'Unrestricted Electrical Licence' issued in an Australian state or territory.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **2 units** of competency must be attained.

UEECD0010	Compile and produce an energy sector detailed report
UEECD0013	Develop and implement energy sector maintenance programs

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Target Group

This Skill Set is intended for persons who are required to develop and implement maintenance electrical programs.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for developing and implementing maintenance programs.

Custom Content Section

Not applicable.

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UEESS00179 Electrical - Install and Set Up Interval Metering Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00056 Electrical - Install and Set Up Interval Metering Skill Set.

Description

This Skill Set covers the skills and knowledge required to install and set up electrical interval metering.

Pathways Information

The unit of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following:

- UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

OR

- a current 'Unrestricted Electrical Licence' issued in an Australian state or territory.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **1 unit** of competency must be attained.

UEEEL0013 Install, set up and commission interval metering

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Target Group

This Skill Set is intended for persons who are required to install and set up interval metering.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing and setting up interval metering.

Custom Content Section

Not applicable.

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UEESS00180 Electrical - Plan, Manage and Report on Electrical Projects Skill Set

Modification History

Release 1: This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

This Skill Set replaces and is equivalent to UEESS00125 Electrical - Plan, Manage and Report on Electrical Projects Skill Set.

Description

This Skill Set covers skills, knowledge and work performance requirements to allow qualified electricians to plan electrotechnology projects, apply work health and safety (WHS)/occupational health and safety (OHS) regulations, industry standards and codes of practices in the workplace, compile and produce an energy sector detailed report, and manage large electrical projects.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following:

- UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

OR

- a current 'Unrestricted Electrical Licence' issued in an Australian state or territory.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of **4 units** of competency must be attained.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace

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UEECD0010	Compile and produce an energy sector detailed report
UEECD0029	Plan electrotechnology projects
UEEEL0015	Manage large electrical projects

Target Group

This Skill Set is intended for persons who are required to plan, manage and report on electrical projects within the energy sector.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for planning, managing and reporting on electrical projects.

Custom Content Section

Not applicable.

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UEESS00181 Electrical - Inspect, Test and Maintain Emergency Lighting and Alarm Systems and Equipment

Modification History

Release 1. This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

Description

This Skill Set is for persons who are required to inspect, test and maintain emergency lighting and alarm systems and equipment.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following:

- UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

OR

- Certificate III in Electrotechnology Electrician

Licensing/Regulatory Information

Competency development activities in this Skill Set are subject to regulations directly related to licensing.

Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Skill Set Requirements

A total of 2 **units of competency** must be attained.

There are units of competency within this Skill Set that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with.

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A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*
UEEEL0076	Inspect, test and maintain emergency lighting systems*

Target Group

This Skill Set is intended for persons who are required to inspect, test and maintain emergency lighting and alarm systems and equipment.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for inspecting, testing and maintaining emergency lighting and alarm systems and equipment.

Custom Content Section

Not applicable.

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UEESS00182 Identify and Isolate Multiple Supply Systems

Modification History

Release 1. This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

Description

This Skill Set is for individuals who are required to identify and isolate multiple supply systems in the electrotechnology industry.

Pathways Information

The unit of competency in this Skill Set will contribute to the completion of a relevant Certificate IV qualification from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

This Skill Set has been designed to meet jurisdictional regulatory and/or licensing currency requirements for holders of an 'Unrestricted Electrical Licence'.

Skill Set Requirements

A total of 1 **unit of competency** must be attained.

The unit of competency within this Skill Set contains pre-requisites. Refer directly to the unit of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEERE0050 Identify and isolate multiple supply systems*

Target Group

This Skill Set is intended for qualified electricians who are required to identify and isolate multiple supply systems at a premise with or without grid connection.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for individuals that are identifying and isolating multiple supply systems.

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Custom Content Section

Not applicable.

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UEESS00183 RAC - Inspect, Test and Repair Fire and Smoke Control Features of Mechanical Services Systems

Modification History

Release 1. This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

Description

This Skill Set is for persons who are required to inspect, test and repair all safety measures relating to fire and smoke control features of mechanical services systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant refrigeration and air conditioning Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following qualification:

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

Competency development activities in this Skill Set are subject to regulations directly related to licensing.

Additional licences, permits and/or other conditions may apply in some jurisdictions subject to regulations related to fire and smoke control features of mechanical services systems work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.

Permits may also be required for some work environments, such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Skill Set Requirements

A total of 3 **units of competency** must be attained.

There are units of competency within this Skill Set that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with.

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A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEERA0051	Install, commission, service and maintain air conditioning systems*
UEERA0096	Inspect, test and repair fire and smoke control features of mechanical services systems*

Target Group

This Skill Set is intended for persons who are required to inspect, test and repair fire and smoke control features of mechanical services systems

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for inspecting, testing and repairing fire and smoke control features of mechanical services systems

Custom Content Section

Not applicable.

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UEESS00184 RAC - Install, Commission, Service and Maintain Variable Refrigerant Flow Air Conditioning Systems

Modification History

Release 1. This is the first release of this Skill Set in the UEE Electrotechnology Training Package.

Description

This Skill Set is for persons who are required to install, commission, service and maintain variable refrigerant flow air conditioning systems.

Pathways Information

The units of competency in this Skill Set will contribute to the completion of relevant refrigeration and air conditioning Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Entry Requirements

It is essential that persons undertaking this Skill Set already hold the following qualification:

- Certificate III in Air Conditioning and Refrigeration

Licensing/Regulatory Information

The skills and knowledge described in this unit require a current national Trainee or Full Refrigeration and Air Conditioning Refrigerant Handling Licence as it includes work on refrigeration and air conditioning equipment that carries the risk of a fluorocarbon refrigerant being emitted while decanting, manufacturing, installing, commissioning, servicing, maintaining or decommissioning activities are being carried out.

Skill Set Requirements

A total of 3 **units of competency** must be attained.

There are units of competency within this Skill Set that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace

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UEERA0051	Install, commission, service and maintain air conditioning systems*
UEERA0097	Install, commission, service and maintain variable refrigerant flow air conditioning systems*

Target Group

This Skill Set is intended for persons who are required to install, commission, service and maintain variable refrigerant flow air conditioning systems

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for installing, commissioning, servicing and maintaining variable refrigerant flow air conditioning systems.

Custom Content Section

Not applicable.

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UEESS00185 Sustainable - Designer-Installer of Grid Connected Photovoltaic Systems Skill Set

Modification History

Release 1: This Skill Set replaces but is not equivalent to UEESS00160 Sustainable - Designer-Installer of Grid Connected Photovoltaic Systems.

Two units added to Skill Set Requirements.

Description

This Skill Set is for persons who are required to design and install grid-connected photovoltaic systems.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set already hold a current unrestricted electrical licence issued in an Australian state or territory.

Skill Set Requirements

A total of 5 **units** of competency must be attained.

There are units of competency within this Skill Set that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEERE0011	Design grid-connected photovoltaic power supply systems*
UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*
UEERE0049	Apply safe work practices in the rooftop solar industry

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UEERE0050 Identify and isolate multiple supply systems*

Target Group

This Skill Set is intended for persons who are required to design and install grid-connected photovoltaic system.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for a designer and installer of grid-connected photovoltaic systems.

Custom Content Section

Not applicable.

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UEESS00186 Sustainable - Installer of Grid Connected Photovoltaic Systems Skill Set

Modification History

Release 1: This Skill Set replaces but is not equivalent to UEESS00168 Sustainable - Installer of Grid Connected Photovoltaic Systems.

Two units added to Skill Set Requirements.

Description

This Skill Set is for persons who are required to install grid-connected photovoltaic systems.

Pathways Information

The units of competency in this Skill Set can contribute to the completion of relevant Certificate III, Certificate IV, Diploma and Advanced Diploma qualifications from the UEE Electrotechnology Training Package.

Licensing/Regulatory Information

It is essential that persons undertaking this Skill Set already hold a current Unrestricted Electrical Licence issued in an Australian state or territory.

Skill Set Requirements

A total of 4 **units** of competency must be attained.

There are units of competency within this Skill Set that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

UEERE0016	Install, configure and commission LV grid-connected photovoltaic power systems*
UEERE0022	Solve basic problems in photovoltaic energy apparatus and systems*
UEERE0049	Apply safe work practices in the rooftop solar industry
UEERE0050	Identify and isolate multiple supply systems*

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Target Group

This Skill Set is intended for persons who are required to install grid-connected photovoltaic systems.

Suggested words for Statement of Attainment

This Skill Set from the UEE Electrotechnology Training Package meets the industry requirements for an installer of grid-connected photovoltaic systems.

Custom Content Section

Not applicable.

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